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# Air Force Research Laboratory, Kirtland AFB, NM: FY09 Economic Impact Assessment

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THE UNIVERSITY *of*  
NEW MEXICO

BUREAU *of* BUSINESS  
& ECONOMIC RESEARCH

**AIR FORCE RESEARCH LABORATORY  
KIRTLAND AFB, NM  
FY09 ECONOMIC IMPACT ASSESSMENT**

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May 2012

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Doleswar Bhandari

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## Acronyms

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**AFRL** – Air Force Research Laboratory at Kirtland Air Force Base

**BBER** – Bureau of Business and Economic Research, University of New Mexico

**FPDS** – Federal Procurement Data System

**FY09** – Federal Fiscal Year 2009 (10-1-08 to 9-31-09)

**Kirtland AFB** – Kirtland Air Force Base located in Albuquerque, New Mexico

**PRS** – Phillips Research Site

**RD** – Directed Energy Directorate, formerly abbreviated DE

**RV** – Space Vehicles Directorate, formerly abbreviated SV

# Executive Summary

The University of New Mexico's Bureau of Business and Economic Research (BBER) was commissioned by the New Mexico Institute of Mining and Technology, an Air Force Research Laboratory partnership intermediary, to estimate the economic impact of the Air Force Research Laboratory (AFRL) at Kirtland Air Force Base (Kirtland AFB) on the economy of New Mexico for Federal Fiscal Year 2009 (FY09). This analysis covers the economic impact of the Directed Energy Directorate (RD) and the Space Vehicles Directorate (RV), hereafter referred to as AFRL, and which constitute the Phillips Research Site (PRS) at Kirtland in Albuquerque, NM.

In FY09, AFRL accounted for \$97 million in expenditures and directly created 849 jobs and \$93 million in salaries and benefits in New Mexico. This is a slight decrease from FY04 when total direct employment was 876. In addition, in FY09, contractors spent \$149 million and directly created 1,072 jobs and \$77 million in salaries and benefits in New Mexico. Altogether, AFRL spent \$246 million within New Mexico in FY09 (Table ES.1).

The total economic impact of the \$246 million in AFRL direct in-state expenditures in FY09 is estimated to have supported \$461 million in industry output and 3,835 jobs with \$237 million in labor income (Table ES.1). It is estimated that the total tax revenues to the State in FY09 as a result of the spending by AFRL amounted to \$16.6 million consisting of \$7.8 million in gross receipt tax (GRT), \$3.5 million in property tax and \$5.3 million in personal income tax.

**Table ES.1 Summary of Economic Impacts, AFRL at Kirtland AFB, FY09**

<b>Impact Type</b>	<b>Number of Employees</b>	<b>Employee Compensation including benefits (\$ millions)</b>	<b>Total Expenditures in New Mexico (Economic Output) (\$ millions)</b>
<b>Direct Impact <sup>1</sup></b>			
Directed Energy (RD)	507	57	59
Space Vehicles (RV)	342	36	38
RD & RV Contractors	1,072	77	149
<b>Sub-Total</b>	<b>1,921</b>	<b>170</b>	<b>246</b>
<b>Indirect <sup>2</sup> &amp; Induced <sup>3</sup> Impacts</b>			
Directed Energy (RD)	467	16	56
Space Vehicles (RV)	301	10	35
RD & RV Contractors	1,146	40	124
<b>Sub-Total</b>	<b>1,914</b>	<b>67</b>	<b>215</b>
<b>Total Impacts</b>	<b>3,835</b>	<b>237</b>	<b>461</b>

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<sup>1</sup> Direct Impacts = AFRL payroll, purchases of goods & services and construction

<sup>2</sup> Indirect Impacts = Expenditures by NM companies from which AFRL directly buys goods & services

<sup>3</sup> Induced Impacts = Employment in NM that is induced when AFRL employees or contractor employees spend their earnings on items such as housing, food, clothing, childcare, etc. in New Mexico.

Looking at each Directorate, the total economic impact of RD including their contractors was \$285.5 million in industry output, 2,412 jobs and \$150 million in labor income (Table 3.1). The total economic impact of RV including their contractors was \$176 million in industry output, 1,423 jobs and \$86.8 million in labor income (Table 3.4).

The IMPLAN Version 3.0 economic impact model was used to estimate the indirect and induced impacts of AFRL. Data were obtained from AFRL units including RD, RV, La Luz Academy, and Tech Transfer. Contractor data were obtained by conducting a survey of RD and RV contractors with a primary place of performance or main location<sup>1</sup> in New Mexico and where a portion of the contract date(s) fell within FY09.

It should be noted that this study also identified areas of potentially significant economic impacts that could not be captured in the numbers reported above. BBER's analysis does not cover impacts from classified contractors, retirees, out-of-state visitors, and expenditures covered by Kirtland AFB such as utilities, on-base construction and building maintenance.

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<sup>1</sup> Primary Place of Performance is the location where the work is performed for the contract. Main location (i.e. vendor location) is the location of the contractor's headquarters.

# 1 Introduction

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The University of New Mexico's Bureau of Business and Economic Research (BBER) was commissioned by the New Mexico Institute of Mining and Technology to estimate the economic impact of the Air Force Research Laboratory (AFRL) at Kirtland AFB on the economy of New Mexico for Federal Fiscal Year 2009 (FY09). This analysis covers the economic impacts in terms of employment, income and output of the AFRL Directed Energy Directorate (RD) and Space Vehicles Directorate (RV), jointly referred to as AFRL in this report.

The economic impact of AFRL was assessed by identifying and measuring the employment, income, output and tax revenues in New Mexico made possible by AFRL spending in the State. This study examines how AFRL's spending and employment stimulates the New Mexico economy and supports a higher level of economic activity. All of the revenues that support AFRL's budget come from out-of-state sources. The economic and fiscal impacts documented in this report show how the dollars that flow to AFRL from out-of-state sources support direct spending on wages and salaries, on employee benefits, on New Mexico-based contractors, and on local goods and services, and how this local spending supports additional economic activity in New Mexico.

This is the sixth in a series of economic impact assessments of the Phillips Research Site conducted by the Bureau of Business and Economic Research. All the data collected for the present study relate to operations during Federal Fiscal Year 2009 (10-1-08 to 9-31-09). Previous analyses were done for Fiscal Years 1993, 1994, 1996, 2000 and 2004. However, reorganizations within AFRL limit the ability to compare impacts across the years. Additionally, as the process has evolved there have been changes in scope and the methods used in data collection and assessment. Thus, while efforts were made to structure the written document in a similar manner, any year-to-year comparisons should be made with caution.

Data were collected from both primary and secondary sources. Primary data on RD's and RV's direct employment, compensation, and purchases of goods and services were used to measure the direct impacts of the organizations. AFRL also contracts out its research activities to various private and public entities. To collect the primary data from these contractors, BBER developed a survey instrument and conducted an internet survey using Survey Monkey.

A note of caution is in order. Interpretation of the numbers presented in this report should be done with an understanding of its limitations which are as follows:

- The contractor portion of this study only captured the impacts of contracts disclosed on the FPDS website, a public searchable database of all public contracts. BBER was provided no information on the share of undisclosed contracts, i.e., classified contracts. This may result in significant underestimation of the AFRL impacts in New Mexico.
- AFRL might have organized many events and activities that attracted out-of-state visitors to New Mexico. Due to the lack of comprehensive out-of-state visitor data, BBER did not venture to estimate the economic impacts of these events. This may lead to underestimation of the impacts of AFRL. Please note that during FY04, a total of 8,992 visitors days were identified with an estimated visitor spending of \$1.1 million.



- BBER's analysis does not cover impacts from retirees and expenditures covered by Kirtland AFB such as utilities, on-base construction and building maintenance. In addition, contractors not listed in the FPDS database as having New Mexico as their main headquarters or primary place of performance (PPP) may have some contracted employees living in New Mexico whose impacts are not included in this report.
- The expenditures of non-respondent contractors were estimated. The procedure is explained in Appendix A. In addition, some respondents chose to provide only total expenditure data without specifying the portions spent on compensation or purchases of goods & services.
- There are many ways to estimate the economic impacts of AFRL on the New Mexico economy and different approaches may yield different results. The impact numbers in this report are a snapshot of FY09. While AFRL programs may be expected to have a long-term impact on the economy, we do not attempt to measure the dynamic impact of its programs and associated technological innovations.

### **1.1 The Air Force Research Laboratory at Kirtland AFB (Phillips Research Site)**

The Phillips Research Site (PRS) is located at Kirtland Air Force Base in Albuquerque, New Mexico. PRS is comprised of two Air Force Research Laboratory Directorates – Directed Energy (RD) and Space Vehicles (RV).

The mission of the Air Force Research Laboratory is to discover, develop, integrate, and deliver affordable technologies for improved warfighting capabilities. It was formed in October 1997, as the product of an organizational consolidation that integrated the previously separate Air Force laboratories (Armstrong, Phillips, Rome and Wright-Patterson) with the Air Force Office of Scientific Research. There are 10 directorates located across the country, including two located at Kirtland AFB. They are the Directed Energy Directorate and the Space Vehicles Directorate (referred to as AFRL in this report).

The Directed Energy Directorate (RD) is the U.S. Air Force's "Center of Excellence" for directed energy technology. RD specializes in technologies required for high-energy lasers, high-power microwaves, high-power millimeter waves and advanced optics. Additional technologies include optical imaging and communication technologies and modeling, simulation and effects studies.

The Space Vehicles Directorate (RV) is the U.S. Air Force's "Center of Excellence" for space research and development. RV has a mission to develop and transition high pay-off space technologies supporting the warfighter while leveraging commercial, civil and other government capabilities to ensure America's advantage.

RD and RV collaboratively support two separate small units for outreach programs and technology transfer called La Luz Academy and Tech Transfer, respectively. These entities' operation expenditures are also included in this report.

The rest of this report is organized as follows. Section 2 details the methodology and sources of data used in the analysis. Section 3 presents the impact results from the IMPLAN model for each directorate. Section 4 presents the fiscal impacts results (tax revenue estimates).

## 2 Methodology

### 2.1 Data Sources

#### 2.1.1 AFRL Expenditure Data

Integral to the success of this study was the collection of primary data on the income, employment and expenditures made by AFRL within New Mexico. RD and RV provided expenditure data on their military and civilian employee compensation and benefits, goods and services, and construction within New Mexico (Table 2.1). In FY09, AFRL's two directorates together injected at least \$246 million in operating and capital expenditures into the State of New Mexico. RD and RV respectively accounted for 62% and 38% of the total expenditures. AFRL spent \$149 million through contractors which accounted for 61% of the total expenditures. The wage, salary, and benefits information were provided for different income categories.

**Table 2.1 AFRL In-State Expenditures, FY09**

<b>Expenditure Category</b>	<b>Amount (\$ millions)</b>
<b>Directed Energy In-State Expenditures</b>	
<b>Operations</b>	58.9
Military Employee Compensation and Benefits	17.6
Civilian Employee Compensation and Benefits	39.2
Goods & Services	2.0
Education	0.04
Construction	--
<b>Contractors</b>	93.5
<b>Total Directed Energy In-State Expenditures</b>	<b>152.4</b>
<b>Space Vehicles In-State Expenditures</b>	
<b>Operations</b>	37.9
Military Employee Compensation and Benefits	6.6
Civilian Employee Compensation and Benefits	29.3
Goods & Services	0.6
Education	0.1
Construction	1.3
<b>Contractors</b>	55.6
<b>Total Space Vehicles In-State Expenditures</b>	<b>93.5</b>
<b>Total Direct In-State Expenditures FY09</b>	<b>245.9</b>

BBER was also provided with a list of distinguished visitors and the duration of their visit to RD and RV during FY09. However, due to lack of comprehensive out-of-state visitor data, BBER did not venture to estimate the economic impacts originating from out-of-state visitor spending. During Federal Fiscal Year 2004, a total of 8,992 visitor days were identified with an estimated visitor spending of \$1.1 million. However, for FY09, BBER was able to obtain records of only 203 visitor days which BBER assumed was not representative of AFRL events that attracted out-of-state visitors.

In addition, La Luz Academy and Tech Transfer, whose expenditures are split 50/50 between RD and RV, provided their internal data separately. The La Luz Academy, an educational outreach program for middle and high-school students on science and engineering, contributes by fostering interest in engineering and scientific careers. Over 1000 New Mexico students participate each year. Although La Luz Academy direct expenditures on compensation and goods & services are included in this report, the potential impact of increasing the number of engineers and scientists in the New Mexico workforce was not easily quantifiable.

### 2.1.2 AFRL Employment

Total employment at AFRL in FY09 was 849 (Table 2.2). RD employed 507 people in New Mexico (165 military and 342 civilian employees). RV employed 342 people (63 military, 269 civilian and 11 construction employees). With both directorates combined, 228 (27%) were military employees, 611 (72%) were civilian employees, and 11 (1%) were construction employees.

**Table 2.2 AFRL Employment, FY09**

	<b>Number of Employees</b>
<b>Directed Energy Employment</b>	<b>507</b>
Military Employees	165
Civilian Employees <sup>1</sup>	342
<b>Space Vehicles Employment</b>	<b>342</b>
Military Employees	63
Civilian Employees <sup>1</sup>	269
Employees on RV construction projects <sup>2</sup>	11
<b>Total Direct In-State Employment FY09</b>	<b>849</b>

<sup>1</sup> Includes La Luz Academy and Tech Transfer, which are split 0.5 FTE between RD and RV

<sup>2</sup> Employment number estimated using IMPLAN for \$1.3 million in construction work. Not direct employees of RV.

### **2.1.3 Contractor Survey**

BBER conducted a survey of RD and RV contractors to collect data on the expenditures by contractors in New Mexico in FY09 (10-1-08 to 9-31-09). The goal was to estimate expenditures by contractors that went directly into the New Mexico economy in the form of employment of New Mexicans and purchase of goods & services from New Mexico vendors.

Contractors selected for the survey were chosen using the Federal Procurement Data System (FPDS), a public searchable database of unclassified government contracts. BBER surveyed all (68) contractors who had contracts where 1) the contract was with RD or RV, 2) the primary place of performance or main location of the contract was in New Mexico, and 3) a portion of the contract dates fell within federal fiscal year 2009 (10-1-08 to 9-31-09). Appendix A contains details on the criteria for selection, a copy of the survey, information on the response rate, and a list of contractors who participated in the survey.

BBER put significant effort into obtaining survey responses and the result was a significant improvement in response rate, up from 30% in 2004 to 64% for this report. Candle Lane Consulting assisted in compiling the most recent specific contacts for each contract on record and BBER performed multiple follow-up calls to ultimately find the right contract manager for each contract surveyed. Because each contractor can be awarded multiple contracts, BBER estimated the response rate of both contractors and contracts (Appendix A.1). In the case of RD, a total of 92 contracts were surveyed from 40 contractors. BBER received a response from 58% of RD contractors resulting in a contract response rate of 55%. In the case of RV, a total of 45 contracts were surveyed from 28 contractors. BBER received a response from 71% of RV contractors resulting in a contract response rate of 82%.

Survey data were used to impute the numbers presented in the Table 2.3, which presents the AFRL contractors' in-state expenditures in FY09 by NAICS code. The total estimated in-state contract amount for various research activities amounted to \$149 million, of which \$93.5 million (63%) was from RD and \$55.6 million (37%) was from RV. This table includes estimated expenditure data for contractors who could not be contacted or who chose to not participate in the survey. The expenditures of these non-respondent contractors were estimated using the Action Obligation values provided in the FPDS database (Appendix A). Expenditure data related to classified contracts could not be provided by AFRL. As a result, this analysis may underreport the impacts of AFRL on New Mexico's economy.

**Table 2.3 Contractor In-State Expenditures by NAICS Code, FY09**

<b>NAICS<sup>1</sup></b>	<b>NAICS Code Definition</b>	<b>Amount<sup>2</sup> (\$ thousands)</b>
<b>Directed Energy</b>		<b>93,511</b>
333512	Machine Tool (Metal Cutting Types) Manufacturing	103
334519	Other Measuring and Controlling Device Manufacturing	53
541330	Engineering Services	27,483
541711	Research and Development in Biotechnology	53
541712	Research and Development in the Physical, Engineering, and Life Sciences	64,638
541720	Research and Development in the Social Sciences and Humanities	98
541990	All Other Professional, Scientific, and Technical Services	92
561621	Security Systems Services	991
<b>Space Vehicles</b>		<b>55,621</b>
334413	Semiconductor and Related Device Manufacturing	443
336419	Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Mfg	4,116
541330	Engineering Services	2,252
541380	Testing Laboratories	154
541513	Computer Facilities Management Services	17,869
541519	Other Computer Related Services	288
541690	Other Scientific and Technical Consulting Services	1,196
541712	Research and Development in the Physical, Engineering, and Life Sciences	26,152
541720	Research and Development in the Social Sciences and Humanities	156
561210	Facilities Support Services	41
611310	Colleges, Universities, and Professional Schools	1,737
(blank)	NAICS code not specified	1,216
<b>Total Direct In-State Contractor Expenditures FY09</b>		<b>149,131</b>

<sup>1</sup> Expenditures are aggregated by NAICS code for analysis by IMPLAN. Individual contractor responses are confidential.

<sup>2</sup> Includes both contractors who responded to BBER's contractor survey and estimates from the FPDS for expenditures of contractors who could not be contacted or who chose not to participate.

## 2.2 Economic Modeling Using IMPLAN

The IMPLAN Version 3.0 economic impact model<sup>2</sup> was used to measure the direct, indirect and induced impacts of AFRL on the New Mexico economy.

The IMPLAN Model databases draw from a variety of data sources to develop an input-output table appropriate for an individual state or other geographic unit and can be used in estimating the total economic impacts of economic activity. **Direct impacts** come from AFRL operations, e.g., payroll employment, local purchases on goods and services, and from AFRL capital outlays such as construction projects. **Indirect impacts** are a result of spending by New Mexico companies (contractors) from which AFRL buys goods and services. This spending creates a demand for the goods and services of local companies, which must then subsequently purchase their own goods and services to produce their product. The sum totals of these iterative purchases are termed indirect impacts. **Induced impacts** result when the employees supported by AFRL activities spend their earnings on items such as housing, food, clothing, or childcare. This spending *induces* additional employment in many sectors of the economy, such as jobs at the local grocery store. Indirect and induced impacts are estimated using economic impact models, such as IMPLAN. Appendix B details the methodology of economic modeling.

## 2.3 State of New Mexico as Impact Region

Economic impact analysis is concerned with estimating the effects on the overall economy of a region from funds that enter the economy's spending stream from outside the region. In this case the region is New Mexico. All AFRL funding is received either directly or indirectly from the federal government and AFRL operates on a military base funded by the Department of Defense. Thus, all expenditures and outlays in support of AFRL bring new dollars into the State. Economic impacts are most commonly measured and defined in terms of employment and income. The employment and income impacts are calculated by researching and analyzing the direct impacts and by using standard multiplier techniques to estimate the indirect and induced effects.

New Mexico benefits economically from all federal funds appropriated to AFRL that are actually expended in the State. These expenditures increase the overall economic activity in the state and produce benefits in three distinct stages. First, a portion of AFRL expenditures directly supports jobs, payroll and benefits for RD and RV employees residing in New Mexico. These jobs generate immediate gains in New Mexico household income, which in turn produces tax revenue for state and local government. Second, AFRL expenditures with contractors and on goods and services (for example, utilities, travel, and building maintenance) indirectly support additional jobs, income and tax revenue within the state. Finally, New Mexico's economy benefits through subsequent rounds of spending by households and businesses. This spending induces additional employment, income and tax revenue.

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<sup>2</sup> Minnesota IMPLAN Group, Inc. IMPLAN System (data & software), 1725 Tower Drive West, Suite 140, Stillwater, MN 55082. <http://www.implan.com>. The IMPLAN model is widely used in conducting economic impact analyses for different regions. BBER used the IMPLAN model version 3.0 in this analysis.

### 3 Economic Impacts of AFRL at Kirtland AFB on the New Mexico Economy

In FY09, AFRL accounted for \$97 million in expenditures and directly created 849 jobs and \$93 million in salaries and benefits in New Mexico. This is a slight decrease from FY04 when total direct employment was 876. In addition, in FY09, contractors spent \$149 million and directly created 1,072 jobs and \$77 million in salaries and benefits in New Mexico. Altogether, AFRL spent \$246 million within New Mexico in FY09.

The total economic impact of the \$246 million from AFRL direct in-state expenditures in FY09 is estimated to have supported \$461 million in industry output and 3,835 jobs with \$237 million in labor income (Table ES.1). Looking at each Directorate individually, the total economic impact of RD including their contractors was \$285.5 million in industry output, 2,412 jobs and \$150 million in labor income (Table 3.1). The total economic impact of RV including their contractors was \$176 million in industry output, 1,423 jobs and \$86.8 million in labor income (Table 3.4).

It is estimated that the total tax revenues to the State in FY09 as a result of the spending by AFRL amounted to \$16.6 million consisting of \$7.8 million in GRT, \$3.5 million in property tax and \$5.3 million in personal income tax.

The following sections present the economic impacts of RD and RV in detail.

#### 3.1 Economic Impacts of the Directed Energy Directorate

Table 3.1 presents the total economic impacts of RD on the New Mexico economy. It includes impacts associated with RD operation and RD contractor expenditures that occurred in New Mexico. The total economic impact to the State was 2,412 in employment, \$150 million in labor income, and \$285 million in industry output. Table 3.2 details RD operation impacts and Table 3.3 details contractor impacts associated with RD research and development expenditures in New Mexico. It is estimated that 507 military and civilian direct jobs, \$57 million in labor income and \$59 million in total expenditures produced an additional 467 indirect and induced jobs, \$16.3 million in indirect and induced labor income, \$55.5 million in indirect and induced output resulting in a total impact of 973 jobs, \$73.2 million in labor income and \$114.4 million in industry output.

**Table 3.1 Total Economic Impacts of RD (Operations and Contractors), FY09**

Impact Type	Number of Employees	Labor Income (\$ millions)	Value Added (\$ millions)	Output (\$ millions)
<b>Total</b>	<b>2,412</b>	<b>\$150.2</b>	<b>\$178.1</b>	<b>\$285.5</b>

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**Table 3.2 Economic Impacts of RD Operations, FY09**

<b>Impact Type</b>	<b>Number of Employees<sup>1</sup></b>	<b>Labor Income<sup>2</sup></b> (\$ millions)	<b>Value Added<sup>3</sup></b> (\$ millions)	<b>Output<sup>4</sup></b> (\$ millions)
Direct	507	\$56.8	\$56.8	\$58.9
Indirect	64	\$3.0	\$4.5	\$11.5
Induced	403	\$13.3	\$24.5	\$44.0
<b>Total</b>	<b>973</b>	<b>\$73.2</b>	<b>\$85.9</b>	<b>\$114.4</b>

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<sup>1</sup> Direct Employees = Directed Energy military and civilian employees

<sup>2</sup> Direct Labor Income = Directed Energy employee compensation including benefits

<sup>3</sup> Value Added = Employee compensation, proprietor income, other property income and indirect business taxes

<sup>4</sup> Direct Output = Directed Energy total NM expenditures on operations including both compensation and goods and services

RD contracted out a significant portion of its research and development activities to various in and out-of-state contractors (including both private and public institutions) whose primary place of performance or main location was in New Mexico according to the FPDS database (Table 3.3). BBER estimated that RD contracted out \$93.5 million worth of R & D activities in FY09. Using IMPLAN, BBER also estimated that the total economic impact of contractors to the State was 1,439 jobs, \$77 million in labor income and \$171 million in economic output. Direct job numbers reported by the contractors may be significantly different from the numbers produced by our analysis. The disparity is due to the fact that the IMPLAN model estimates on an annual basis, whereas, contractors may report a job number for a time period that is relatively shorter or longer. Furthermore, BBER had to rely on the IMPLAN model to estimate the employment, income and output for the activities of non-respondent contractors. Therefore, BBER relied on the model to estimate the direct impacts of the RD contractors.

**Table 3.3 Economic Impacts of RD Contractors, FY09**

<b>Impact Type</b>	<b>Number of Employees<sup>1</sup></b>	<b>Labor Income<sup>2</sup></b> (\$ millions)	<b>Value Added<sup>3</sup></b> (\$ millions)	<b>Output<sup>4</sup></b> (\$ millions)
Direct	725	\$52.1	\$49.3	\$93.5
Indirect	299	\$11.2	\$17.8	\$32.4
Induced	415	\$13.7	\$25.1	\$45.1
<b>Total</b>	<b>1,439</b>	<b>\$77.0</b>	<b>\$92.2</b>	<b>\$171.0</b>

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<sup>1</sup> Direct Employees = Contractor employees

<sup>2</sup> Direct Labor Income = Contractor employee compensation including benefits

<sup>3</sup> Value Added = Employee compensation, proprietor income, other property income and indirect business taxes

<sup>4</sup> Direct Output = Contractor total expenditures on operations including both payroll and goods and services



### 3.2 Economic Impacts of the Space Vehicles Directorate

Table 3.4 presents the total economic impacts of RV on the New Mexico economy. The total impact to the state was 1,423 in employment, \$87 million in labor income, and \$176 million in industry output. These impacts include not only RV operations and construction but also contractors' impacts in the State of New Mexico. Table 3.5 details the economic impacts of RV operations and construction. In FY09, 342 persons were employed directly by RV with \$36.4 million in compensation. As a result of RV's expenditures in the State, an additional 301 jobs with \$11 million in labor income were created through indirect and induced spending. Construction impacts accounted for about 2% of the total (Table 3.6).

**Table 3.4 Total Economic Impacts of RV Operations, Contractors and Construction, FY09**

<b>Impact</b>	<b>Number of Employees</b>	<b>Labor Income</b> (\$ millions)	<b>Value Added</b> (\$ millions)	<b>Output</b> (\$ millions)
<b>Total</b>	<b>1,423</b>	<b>\$86.8</b>	<b>\$106.3</b>	<b>\$176.0</b>

UNM Bureau of Business and Economic Research

**Table 3.5 Economic Impacts of RV Operations and Construction, FY09**

<b>Impact Type</b>	<b>Number of Employees<sup>1</sup></b>	<b>Labor Income<sup>2</sup></b> (\$ millions)	<b>Value Added<sup>3</sup></b> (\$ millions)	<b>Output<sup>4</sup></b> (\$ millions)
Direct	342	\$36.4	\$36.4	\$37.9
Indirect	41	\$2.0	\$3.0	\$7.6
Induced	260	\$8.6	\$15.7	\$28.3
<b>Total</b>	<b>644</b>	<b>\$46.9</b>	<b>\$55.1</b>	<b>\$73.7</b>

UNM Bureau of Business and Economic Research

<sup>1</sup> Direct Employees = Space Vehicle military, civilian, and construction employees

<sup>2</sup> Direct Labor Income = Space Vehicle employee compensation including benefits

<sup>3</sup> Value Added = Employee compensation, proprietor income, other property income and indirect business taxes

<sup>4</sup> Direct Output = Space Vehicle total expenditures on operations including both payroll, allowance, and goods and services

**Table 3.6 Economic Impacts of RV Construction Activities, FY09**

<b>Impact Type</b>	<b>Number of Employees</b>	<b>Labor Income</b> (\$ millions)	<b>Value Added</b> (\$ millions)	<b>Output</b> (\$ millions)
Direct	11	\$0.47	\$0.52	\$1.26
Indirect	3	\$0.15	\$0.22	\$0.44
Induced	4	\$0.13	\$0.25	\$0.44
<b>Total</b>	<b>18</b>	<b>\$0.75</b>	<b>\$0.98</b>	<b>\$2.13</b>

As in RD, RV also contracted out a significant portion of its research and development activities to various contractors whose primary place of performance or main location was in New Mexico (Table 3.7). The contractors who received funding from RV are estimated to have spent \$55.6 million on employee compensation and purchases of goods and services in FY09. Using IMPLAN, BBER estimated that the total economic impact of contractors to the State was 779 in employment, \$40 million in compensation and \$102 million in industry output. Direct job numbers reported by the contractors may be significantly different from the numbers produced by our analysis. The disparity is due to the fact that the IMPLAN model estimates on an annual basis, whereas, contractors may report a job number for a time period that is relatively shorter or longer. In addition, IMPLAN uses in its analysis a national average for the industry which may not coincide with the type of companies contracted by AFRL. Furthermore, BBER had to rely on the IMPLAN model to estimate the employment, income and output for the activities of non-respondent contractors. Therefore, BBER relied on the model to estimate the direct impacts of the RV contractors.

**Table 3.7 Economic Impacts of RV Contractors, FY09**

<b>Impact Type</b>	<b>Number of Employees<sup>1</sup></b>	<b>Labor Income<sup>2</sup></b> (\$ millions)	<b>Value Added<sup>3</sup></b> (\$ millions)	<b>Output<sup>4</sup></b> (\$ millions)
Direct	347	\$24.9	\$25.4	\$55.6
Indirect	217	\$7.9	\$12.8	\$23.3
Induced	215	\$7.1	\$13.0	\$23.3
<b>Total</b>	<b>779</b>	<b>\$39.9</b>	<b>\$51.2</b>	<b>\$102.3</b>

UNM Bureau of Business and Economic Research

<sup>1</sup> Direct Employees = Contractor employees

<sup>2</sup> Direct Labor Income = Contractor employee compensation including benefits

<sup>3</sup> Value Added = Employee compensation, proprietor income, other property income and indirect business taxes

<sup>4</sup> Direct Output = Contractor total expenditures on operations including both payroll and goods and services

### 3.3 Tax Revenue Impacts for the State

The revenue impacts of AFRL were estimated for the State for gross receipt tax (GRT), property tax and income tax. BBER compared two methods for estimating tax impacts, one using IMPLAN and the other using the Institute on Taxation and Economic Policy's tax burden rate<sup>3</sup> by income group for New Mexico. Both methods produced similar results. It is estimated that the total tax revenues to the State in FY09 as a result of the spending by AFRL amounted to \$16.6 million consisting of \$7.8 million in GRT, \$3.5 million in property tax and \$5.3 million in personal income tax. Roughly 62% (\$6.2 million) of these were accounted for by Directed Energy Directorate activities. Additionally, the personal income tax that went to the Federal Government is estimated to be \$11.9 million.

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<sup>3</sup> Institution on Taxation & Economic Policy. *Who Pays? A Distributional Analysis of the Tax Systems in All 50 States*. Third edition, Nov. 2009, p78. <http://www.itepnet.org/whopays3.pdf>

## Appendix A. Contractor Survey

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The survey of contractors contained a letter of authorization from the appropriate directorate, a letter from BBER specifying the contract number(s), survey directions, and a hardcopy of the survey. The list of contractors was based on a database search of the Federal Procurement Data System (FPDS)<sup>4</sup>. Contractors were selected if they met all the following criteria:

- Contracting Office ID = FA9451 (Directed Energy) or FA9453 (Space Vehicles)
- PPP State or Vendor State is in New Mexico (PPP = Primary Place of Performance)
- Effective Date starts on or before 9/30/2009
- Completion Date, Est. Ultimate Completion Date, or Last Date to Order starts on or after 10/1/2008

The survey was conducted from September through November 2010. Appendix Table A.1 presents the survey response rates. Appendix Table A.2 credits the contractors who participated. Appendix Table A.3 presents the expenditure data collected from contractors who chose to participate in the survey. Individual responses are confidential.

**Appendix Table A.1 Contractor Survey Response Rate**

Directorate	Total Letters Mailed	Total Responses Received	% Responses Received	Total Contracts Surveyed	Total Contracts Received	% Contracts Received
Space Vehicles	28	20	71%	45	37	82%
Directed Energy	40	23	58%	92	51	55%
<b>Total</b>	<b>68</b>	<b>43</b>	<b>63%</b>	<b>137</b>	<b>88</b>	<b>64%</b>

For contractors who could not be contacted or who chose not to participate in the survey, BBER estimated their impact on New Mexico using the sum of the Action Obligation<sup>5</sup> values from the FPDS. Survey responses are more accurate than the sum of the Action Obligation values because they reflect the contractor's actual FY09 in-state expenditures. To find out how close the FPDS sum of action obligation values were to the true expenditures reported in survey responses, BBER compared expenditure data from contractors who responded to the survey to the sum of the Action Obligation values for each contract. The RD survey response total expenditures were an average of 53% lower and RV were an average of 46% lower when compared to the sum of the Action Obligation values from the FPDS for each corresponding contract. To correct the FPDS data of contractors who did not participate in the survey, these average percentages were used to determine what fraction of the Action Obligation values were reasonable. The sum of the action obligation values for non-respondent contractors was multiplied by 0.53 (RD contracts) or 0.46 (RV contracts) and the resulting values were assumed to be the FY09 expenditures.

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<sup>4</sup> A searchable database of federal contracts available at [https://www.fpds.gov/fpdsng\\_cms/](https://www.fpds.gov/fpdsng_cms/).

<sup>5</sup> The Action Obligation value is the value obligated or de-obligated by each modification related to a contract. Most contracts have multiple action obligations.

## Appendix Table A.2 Participants in Contractor Survey

Table A.2 Removed to Avoid Disclosure

## Appendix Table A.3 Contractor Expenditures from Survey Responses, FY09

<b>Expenditure Category</b>	<b>Amount (\$ thousands)</b>
<b>Directed Energy Contractor Survey Responses</b>	
Total Expenditures <sup>1</sup>	<b>49,045</b>
Compensation	20,245
Goods & Services	2,833
Construction	63
<b>Space Vehicles Contractor Survey Responses</b>	
Total Expenditures <sup>1</sup>	<b>30,497</b>
Compensation	12,876
Goods & Services	13,409
Construction	-
<b>Total Contractor Survey Responses FY09</b>	<b>79,542</b>

<sup>1</sup> In BBER's contractor survey, total expenditures is determined by the contractor and is the sum of compensation, goods & services, construction *and* any additional in-state FY09 expenditures.

## Appendix Figure A.1 Contractor Survey



DEPARTMENT OF THE AIR FORCE

AIR FORCE RESEARCH LABORATORY (AFRL)

27 October 2010

William T. Cooley, Colonel, USAF  
Material Wing Director, Space Vehicles  
Commander, Phillips Research Site  
3550 Aberdeen Ave SE  
Kirtland AFB NM 87117

[Contact Name]  
[Subcontractor Company Name]  
[Address]  
[City State Zip Code]

Dear [Contact Name]

The Air Force Research Lab (AFRL) Directed Energy Directorate and Space Vehicles Directorate located at Kirtland AFB, NM, makes a substantial contribution to the economy of New Mexico. It is in partnership with companies like yours that technology developments and capabilities necessary to maintain our national security in the areas of directed energy and space are realized.

We have retained the University of New Mexico's Bureau of Business and Economic Research (BBER) to assess the economic impact of AFRL on the New Mexico economy for fiscal year 2009. In the past study, this research revealed that AFRL was a major contributor to the state in terms of jobs and income. In 2004 our combined impact was significant. We believe this positive impact on our state's economy has only increased. Attached is a survey from BBER, to be completed to the best of your ability, regarding your company's employment and expenditures in New Mexico for the contract(s) you have with AFRL. Your participation is vital to this assessment and is greatly appreciated. If you have any questions regarding the survey, please contact Dr. Doleswar Bhandari at [bhandar1@unm.edu](mailto:bhandar1@unm.edu) or (505) 277-2216.

Sincerely

WILLIAM T. COOLEY, Colonel, USAF  
Material Wing Director, Space Vehicles  
Commander, Phillips Research Site

2 Attachments

1. Contract numbers listing
2. Survey/instructions



## AFRL Space Vehicles Subcontractors Survey FY2009

[Contact Name]  
[Subcontractor Company Name]  
[Address]  
[City State Zip Code]

October 27, 2010

Dear [Contact Name],

Kirtland Air Force Research Laboratory (AFRL) has contracted the University of New Mexico's Bureau of Business and Economic Research (BBER) to estimate the economic impact of the Space Vehicles Directorate on the State of New Mexico. As a subcontractor, you are an important part of our analysis.

We request that you complete a short survey reporting the expenditures and employment within New Mexico for Federal Fiscal Year 2009 (10-1-08 to 9-31-09).

**AFRL records indicate you have the following contract(s) with the Space Vehicles Directorate that may have been active in New Mexico during federal fiscal year 2009:**

**Contract Number(s): FA945309C0xxx**

The survey can be filled out and submitted to us online using the link provided below.

<http://www.surveymonkey.com/s/QMGV83Q>

Alternatively, a copy of the survey is attached and can be mailed or faxed to us.

Thank you,

Bureau of Business and Economic Research



## AFRL Space Vehicles Subcontractors Survey FY2009

### Directions for filling out the survey:

The survey should be filled out and submitted to us online using the link provided below. Alternatively, a paper copy of the survey is attached and can be mailed or faxed back to us.

<http://www.surveymonkey.com/s/QMGV83Q>

You will be asked questions regarding expenditures and employment within New Mexico on contracts with the Space Vehicles Directorate for Federal Fiscal Year 2009 (10-1-08 to 9-31-09). The survey has a few questions per contract. Contract number(s) are listed in the letter you received. The survey is confidential.

You may submit separate surveys for each contract, if convenient.

If there were no expenditures or employment within New Mexico in FY09, enter a zero for All Contract Expenditures within NM. Please do not combine contracts. If you have additional contracts with Space Vehicles that were active in NM in FY09 but which are not listed in our letter to you, please add them.

**We only need expenditures and employment within New Mexico for the Federal Fiscal Year 2009 (10-1-08 to 9-31-09).**

Thank you for completing our survey!

Bureau of Business and Economic Research, UNM  
MSC06 3510, 1 University of New Mexico  
Albuquerque, NM 87131-0001  
Attn: AFRL Space Vehicles Subcontractor Survey FY2009  
Contact: Dr. Doleswar Bhandari or Jessica Bloom  
E-mail: [bhandar1@unm.edu](mailto:bhandar1@unm.edu) or [jbloom1@unm.edu](mailto:jbloom1@unm.edu)  
Tel: 505-277-7099 / Fax: 505-277-7066





## AFRL Space Vehicles Subcontractors Survey FY2009

### Person filling out this survey:

Contact person: \_\_\_\_\_

E-mail Address: \_\_\_\_\_

Phone: \_\_\_\_\_

(Contact information is confidential and will not be included in our final report)

### Contract #1:

Contract Number (13 characters starting with FA9453 or F29601): \_\_\_\_\_

Contract NAICS Code: \_\_\_\_\_

Goods & Services Purchased within NM in FY09 (\$): \_\_\_\_\_

Employee Compensation (including benefits) within NM in FY09 (\$): \_\_\_\_\_

Construction Expenditures within NM in FY09 (\$), if any: \_\_\_\_\_

ALL Contract Expenditures within NM (including values above) in FY09 (\$): \_\_\_\_\_

Average Number of Employees within NM in FY09: \_\_\_\_\_

### Contract #2:

Contract Number (13 characters starting with FA9453 or F29601): \_\_\_\_\_

Contract NAICS Code: \_\_\_\_\_

Goods & Services Purchased within NM in FY09 (\$): \_\_\_\_\_

Employee Compensation (including benefits) within NM in FY09 (\$): \_\_\_\_\_

Construction Expenditures within NM in FY09 (\$), if any: \_\_\_\_\_

ALL Contract Expenditures within NM (including values above) in FY09 (\$): \_\_\_\_\_

Average Number of Employees within NM in FY09: \_\_\_\_\_

## **Appendix B. Economic Modeling using IMPLAN**

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In doing an economic impact study such as this, BBER starts with the counterfactual assumption of an economy without AFRL and then examines the various channels through which AFRL's operations and capital program may be expected to affect overall economic activity statewide. The analysis is a comparative static analysis, which is a comparison of two different economic outcomes, before and after a change in the final demand i.e. the NM economy with and without AFRL.

This study is based on a generally accepted method of estimating the economic impacts of an existing project or organization, public or private. In its simplest form, this method can be described as an "export-base" method, because it recognizes only those local expenditures that are supported by out-of-area revenues as having a tangible impact on an area's economy. The rationale behind this method is based upon the assumption that revenues generated from sources within the area would presumably flow to some other activity and yield a positive economic impact if AFRL did not exist. In the case of AFRL, all operating revenues and all of the revenues available for capital outlay come from the federal government or other out-of-state sources. Therefore, all of the economic activity originating from AFRL will be counted as impacts.

Direct, indirect and induced impacts combined yield the total economic activity that results from the share of AFRL expenditures supported by out-of-state revenues. Dividing the total of direct, indirect and induced impacts by the original total direct expenditures results in a **multiplier**, a measure of economic activity generated per dollar or per employee. For example, a multiplier of 1.91 would indicate that for every 100 jobs created by AFRL, this supported an additional 91 jobs outside AFRL in New Mexico.

## Definitions

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- **Employee Compensation:** the sum of wage and salary income, benefits (including health and life insurance), pension payments and other non-cash compensation
- **Employment:** the estimated number of jobs created as a result of AFRL activities
- **Direct Impacts:** the initial, immediate economic impacts generated by AFRL initial expenditures
- **Final Demand:** the sales of economic goods and services to purchasers (households, government, foreign importers, etc.) who are the ultimate users or consumers of these products
- **Indirect Impacts:** the economic impact resulting from spending by New Mexico companies (contractors) from which AFRL buys goods and services. This spending creates a demand for the goods and services of local companies, which must then subsequently purchase their own goods and services to produce their product. The sum total of these iterative purchases is termed indirect impacts.
- **Induced Impacts:** the economic impact resulting from employees spending a portion of their salary on goods and services for personal consumption, e.g. housing, food, clothing, or childcare. This spending *induces* additional employment in many sectors of the economy, such as jobs at the local grocery store.
- **Impact Analysis:** an estimate of the impact of dollars from outside the region on the region's economy
- **Labor Income:** the employee compensation (wage and salary income including benefits) plus proprietors' income (self-employed income)
- **Non-respondent Contractors:** the contractors who could not be contacted or who chose not to participate in the survey
- **Output:** the total market value of goods and services that go to final and intermediate consumption. In this case, it is the total economic activity resulting from AFRL operation and construction activities in the State.
- **Value Added:** the sum of employee compensation (wage and salary plus benefits), proprietor income (payment received by self-employed individuals), other property type income (such as interest, rent, royalties, and dividends) and indirect business taxes (excise and sales taxes paid by individuals to businesses)
- **Visitor Days:** the total number of days out-of-town visitors to RD and RV were in Albuquerque. For example, a two-day conference with 50 out-of-state visitors yields 100 visitor days. During this time, visitors spend money at hotels, restaurants, car rentals, etc.