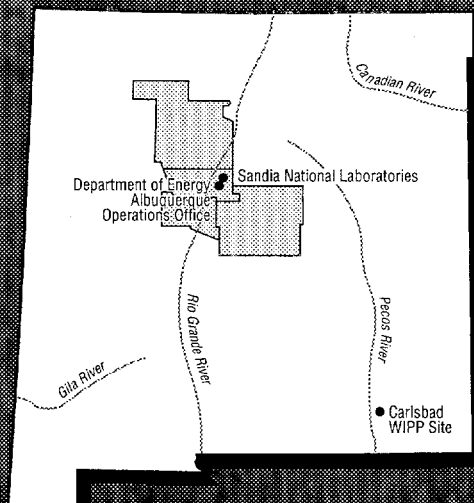


# THE ECONOMIC IMPACT OF SANDIA NATIONAL LABORATORIES ON CENTRAL NEW MEXICO AND THE STATE OF NEW MEXICO

FISCAL YEAR 1997



Office of:  
Technology and Site Programs  
Albuquerque Operations Office  
U.S. Department of Energy



In cooperation with:  
Agricultural Experiment Station  
College of Agriculture and Home Economics  
New Mexico State University

**The Economic Impact of  
Sandia National Laboratories  
on Central New Mexico and the  
State of New Mexico Fiscal Year 1997**

by

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## **PREFACE**

The Albuquerque Operations Office (AL) of the U.S. Department of Energy (DOE) is charged with managing laboratories, production plants, and energy programs in several locations throughout the United States, including New Mexico. Because of the significance of DOE activities in New Mexico, selected economic impact studies have been completed annually since the early 1980s. The types of activities that DOE/AL oversees are, for the most part, an outgrowth of atomic research that started in New Mexico in the 1940s. In New Mexico, activity that was once confined to "the Hill" (Los Alamos National Laboratory), northwest of Santa Fe, has become two national laboratories, a national waste repository, a national remedial action project, and several energy research and conservation programs.

The economic impact on New Mexico has grown over the years to a point where these activities provide tens of thousands of jobs and contribute billions of dollars to the state's economy. Therefore, it is appropriate that a report be provided periodically to the citizens of New Mexico describing the impact of DOE on the state. This report details activities for federal Fiscal Year 1997.



## ACKNOWLEDGMENTS

As is the case with studies of this type, many more people contribute to the effort than just the listed authors. The detailed information needed for the economic modeling and expenditure analysis could not have been obtained without the support of several individuals. Moreover, there are some who contribute but their contributions are not always acknowledged—to those individuals, we apologize.

The employment data by economic sector used in the regional model was obtained from the New Mexico Department of Labor (NMDOL). Steve Pazand, Unit Supervisor, Actuarial Research, NMDOL made certain we obtained the detailed, but unpublished data needed for our research. Larry Blackwell, Chief, Economic Research and Analysis Bureau, NMDOL, also assisted the study team in obtaining the appropriate data. Importantly, this state government department has cooperated fully with our research efforts for several years and should be commended for their continuing efforts to participate in regional economic studies.

Luella Aragon, Staff Accountant, Albuquerque Financial Service Center, Department of Energy (DOE) Albuquerque Operations Office, contacted all the DOE agencies to obtain expenditure information for this study. We thank the SNL budget officials who provided budget and expenditure data in a timely fashion, specifically Richard Shepardson, and Pam Spicer. Also, we thank Bruce Dale, Executive Policy Support, SNL, who provided summarized achievements information.





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## INTRODUCTION

Sandia National Laboratories (SNL) was established in 1949 to perform the engineering development and ordnance responsibilities associated with nuclear weapons. By the early 1960's the facility had evolved into an engineering research and development laboratory and became a multiprogram laboratory during the 1970s. Sandia is operated for the U.S. Department of Energy by the Sandia Corporation, a wholly-owned subsidiary of Lockheed Martin, Incorporated.

For several years, the U.S. Department of Energy (DOE) Albuquerque Operations Office (AL) and New Mexico State University (NMSU) have maintained an inter-industry, input-output model with capabilities to assess the impacts of developments initiated outside the economy such as federal DOE monies that flow into the state, on an economy. This model will be used to assess economic, personal income and employment impacts of SNL on central New Mexico and the state of New Mexico.

Caution should be exercised when comparing economic impacts between fiscal years prior to this report. The fringe benefits coefficients have been updated for the FY 1996 and FY 1997 economic impacts analysis. Prior to FY 1993 two different I/O base models were used to estimate the impacts. New technical information was released by the Bureau of Economic Analysis (BEA), U.S. Department of Commerce in 1991 and in 1994 and was incorporated in FY 1991, FY 1993, and FY 1994 I/O models. Also in 1993, the state and local tax coefficients and expenditure patterns were updated from a 1986 study for the FY 1992 report.

Further revised details about the input-output model can be found in "The Economic Impact of the Department of Energy on the State of New Mexico - FY 1997" report by Lansford, et al. (1997).

For this report, the reference period is FY 1997 (October 1, 1996, through September 30, 1997) includes two major impact analyses: the impact of SNL activities on central New Mexico and the economic impacts of SNL on the state of New Mexico. For purposes of this report, the central New Mexico region includes Bernalillo, Sandoval,

Valencia, and Torrance counties (Figure 1). Total impact represents both direct and indirect responding by business, including induced effects (responding by households). The standard multipliers used in determining impacts result from the inter-industry, input-output models developed for the four-county region and the state of New Mexico.

## PROFILE OF SANDIA NATIONAL LABORATORIES

### History

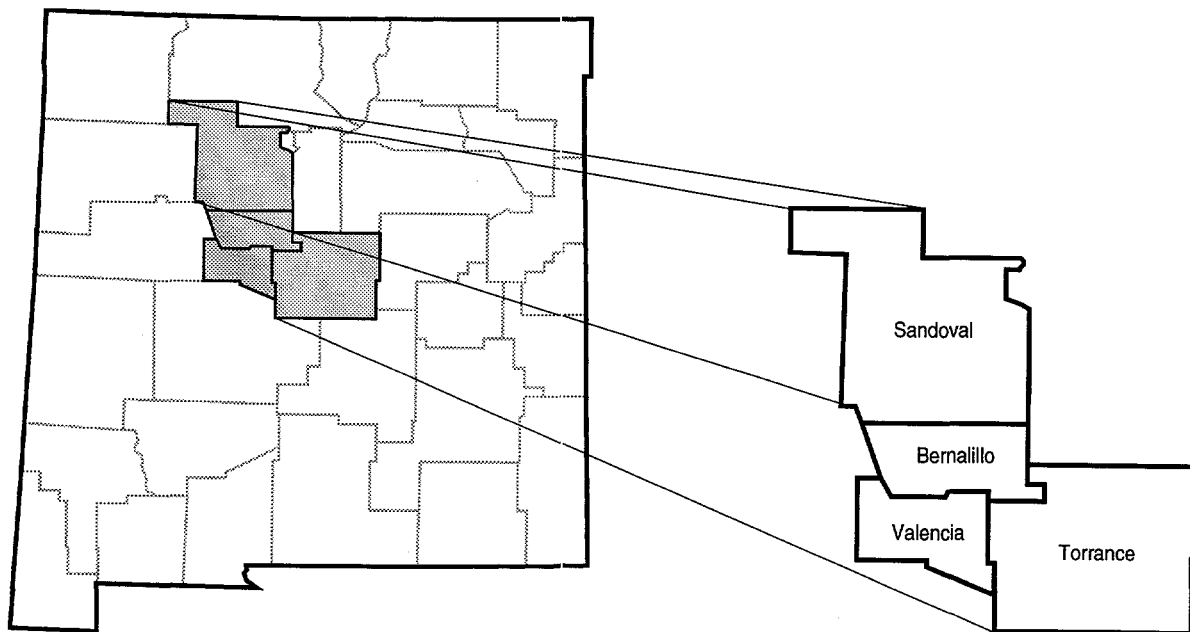
Sandia was established in 1949 to perform the engineering development and ordnance responsibilities associated with nuclear weapons. The facility evolved into an engineering research and development laboratory by the early 1960s. During the 1970s, it became a multiprogram national laboratory with responsibilities in national security, energy, and environmental research and development. Sandia National Laboratories is operated for the United States Department of Energy by Sandia Corporation, a Lockheed Martin Company.

### Background

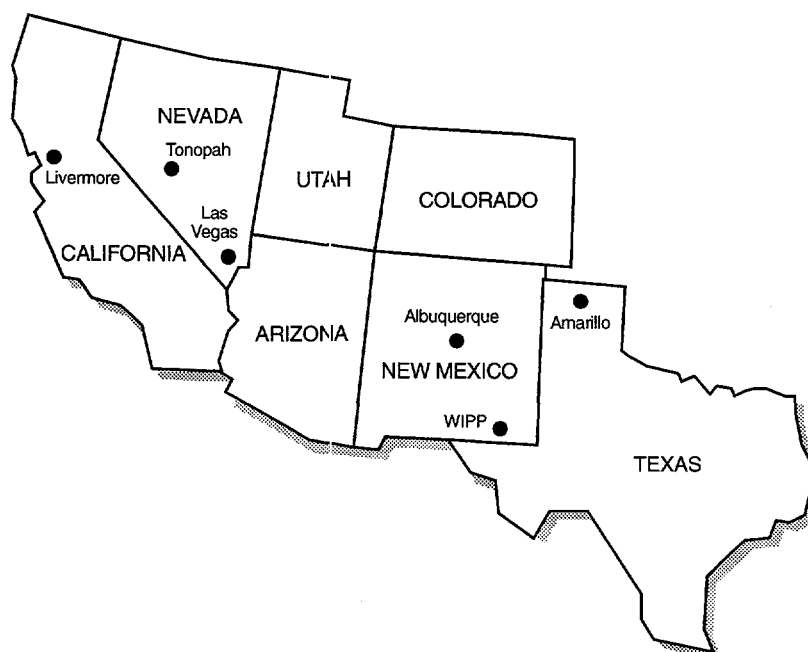
Sandia's executive management offices and larger laboratory complex are located on Kirtland Air Force Base at the southeastern edge of Albuquerque, New Mexico. This site, referred to as Sandia/New Mexico, is composed of five technical areas and an expansive outdoor testing field covering 17,750 acres. This location benefits from its proximity to other major defense laboratories and testing facilities and the emerging high-technology industrial climate in the Rio Grande research corridor. Another Sandia complex in Livermore, California occupies 413 acres at the eastern edge of the San Francisco Bay area. Sandia also operates test facilities in Nevada and Hawaii. Approximately 7,500 people are employed by Sandia, and annual operating funding is about \$1.4 billion.

### Missions and Capabilities

Sandia has responsibility for the engineering development of all U.S. nuclear weapons and for systems integration of the nuclear weapons with their delivery vehicles. National security programs and defense-related environmental programs for



**Figure 1. Sandia National Laboratories Four-County Central New Mexico Region.**



**Figure 2. Location of Sandia National Laboratories Facilities.**

the Department of Energy constitute 65 percent of the laboratory's work. Responsibilities embrace the design, certification, and assessment of the non-nuclear subsystems of nuclear weapons; safety, security, reliability, and use-control; issues associated with the production and dismantlement of nuclear weapons; surveillance and support of weapons in stockpile, environmental restoration and waste management related to the nuclear weapons complex, and substantial work in nuclear intelligence, nonproliferation, and treaty verification technologies. Ten percent of Sandia's work supports DOE missions in energy science, research, and development. About 25 percent of the laboratory's work is for other government agencies, particularly the Department of Defense, in programs where Sandia's unique competencies, built from mission responsibilities, can add value.

#### **Recent Achievements**

- Replaced the aging B53 bomb with a modification of the safer B61 bomb
- Developed a higher-security cryptographic controller for programming bomb use-authorization devices
- Produced world-record x-ray pulses with the z-pinch technique in a particle beam accelerator for applications in weapons physics and inertial confinement fusion
- Developed and tested radiation-hardened integrated circuits that can survive five megarads
- Continued to develop record-breaking software applications on the world's first teraflop computer
- Provided assistance to Russian and Ukraine to protect nuclear materials at 44 sites
- Developed and demonstrated an all-weather, day/night guidance system for penetrator weapons
- Supported the process that resulted in approval of the operating application for the Waste Isolation Pilot Plant in Carlsbad, NM, by the Environmental Protection Agency

#### **Future Prospects**

Funding for defense programs has stabilized as the laboratory focuses on stockpile stewardship and management in the absence of new weapon development programs. Programs in nonproliferation, arms control, and global nuclear materials management are of growing importance. Energy programs are merging with the broader mission for the security of critical infrastructures. Environmental cleanup activities will continue until 2000 with modest change. In the future, Sandia will be increasingly focused on defense programs responsibilities and activities that support the core competencies for that mission.

### **ECONOMIC IMPACTS OF SNL ON CENTRAL NEW MEXICO, FY 1997**

#### **Funding**

Throughout this chapter, funding to or expenditures by major on-site contractors or SNL will be referred to as "activities by SNL" for simplicity. The total SNL funding (operating and capital budget) in central New Mexico in FY 1997 was slightly under \$1.4 billion (Table 1). This funding went for salaries and wages, trade and services, capital equipment, and construction.

#### **SNL Expenditure Patterns**

Total SNL regional expenditures (the initial respending of the total operating and capital budget) amounted to \$840.5 million or about 61 percent of the total budget in FY 1997 (Table 1). The large out-of-region spending by SNL is due primarily because of a significant effort at Livermore, California and at WIPP in southeastern New Mexico.

The ten economic sectors accounting for the majority of SNL regional expenditures for FY 1997 were households (\$523 million), other business services (\$54 million), construction (\$24 million), retail trade (\$39 million), data processing and computer services (\$30 million), management and consulting services (\$27 million), wholesale trade (\$24 million), government services (\$23 million), engineering, architecture and surveying services (\$18 million) and local government (\$17 million). These ten sectors combined accounted for

**Table 1. SNL Expenditures (in dollars) in Central New Mexico by Sector and Total Operating Budget, FY 1997.**

Sector	Total Expenditures
1. Livestock & Livestock Products	
2. Other Agricultural Products	
3. Forestry & Fishery Products	8,805
4. Agriculture, Forestry & Fishery Services	279,723
5. Mining, Crude Petroleum & Natural Gas	193,413
6. Construction	24,349,462
7. Ordnance & Chemical Manu.	90
8. Food & Kindred Products	
9. Textiles Products & Apparel Manu.	14,263
10. Lumber & Wood Products Manu.	300
11. Paper & Publishing Manu.	235,880
12. Petroleum Refining & Products Manu.	(1,442)
13. Glass, Stone & Clay Products Manu.	13,983
14. Primary & Fabricated Metals Manu.	2,313,556
15. Computer, Office & Service Equip. Manu.	16,438,809
16. Electrical Equipment Manu.	1,242,956
17. Scientific Instruments Manu.	923,406
18. All Other Manufacturing	409,131
19. Motor Freight Trans. & Warehousing	289,393
20. All Other Transportation	19,022
21. Communication	6,843,822
22. Electric & Gas Utilities	12,385,584
23. Water & Other Utilities	231,409
24. Wholesale Trade	24,182,098
25. Retail Trade	39,255,328
26. Finance, Insurance & Real Estate	1,824,479
27. Hotel, Restaurant & Other Personal Ser.	725,111
28. Data Processing & Computer Services	29,743,894
29. Management & Consulting Services	27,049,737
30. Eng., Architecture & Surveying Services	17,929,291
31. Other Business Services	54,406,594
32. Automobile & Other Repair Services	4,035,273
33. Amusement, Recreation & Video Services	862,288
34. Health, Education & Social Services	10,779,034
35. Government Services	22,946,227
36. Local Government	17,326,532
37. State Government	8,833
38. Sandia National Laboratories	
39. Households	523,268,408
Total Regional Expenditures	840,534,692
Total Operating and Capital Budget	1,375,011,764
Number of Employees	7,442

about 93 percent of total SNL regional expenditures.

SNL expenditures by major sectors in central New Mexico for FY 1997 were personnel, including benefits (\$523 million); services (\$146 million); trade (\$63 million); government (\$40 million); construction (\$24 million); other sectors (\$22 million); and manufacturing (\$22 million) (Table 2). By far the largest SNL expenditure in central

**Table 2. SNL Expenditures in Central New Mexico by Major Sector, FY 1997.**

Sector	FY 1997 thousands of dollars	(%)
I. Personnel		
A. Salaries & Wages	426,705	50.8
B. Benefits	96,563	11.5
Total	523,268	62.3
II. Construction	24,349	2.9
III. Manufacturing	21,591	2.6
IV. Trade	63,437	7.5
V. Services	145,531	17.3
VI. Government		
A. Local Government	17,327	2.1
B. State Government	9	0.0
C. Government Services	22,946	2.7
Total	40,282	4.8
VII. Other Sectors		
A. Agriculture	289	0.0 (a)
B. Mining	193	0.0 (a)
C. T.C.U. (a)	19,769	2.4
D. F.I.R.E. (b)	1,824	0.2
Total	22,076	2.6
TOTAL EXPENDITURES	840,534	100.0

a. Transportation, communication, and utilities.

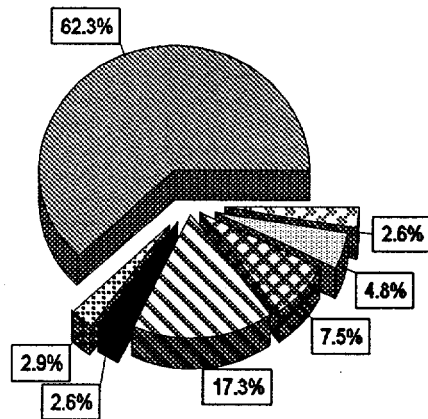
b. Finance, insurance, and real estate.

New Mexico was labor, over 62 percent of the total regional expenditures. In FY 1997, 17 percent of the SNL regional expenditures went for services, 7.5 percent for trade, 5 percent for government, 3 percent for construction, 3 percent for other sectors and 3 percent for manufacturing (Figure 3). The Sandia Corporation, managers of SNL, had approximately 7,442 employees in central New Mexico in FY 1997.

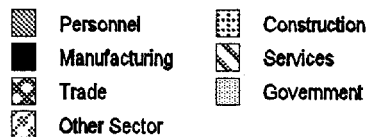
#### Measuring the SNL Economic Impact on Central New Mexico

The analysis of the SNL economic impact on central New Mexico employed an economic model that incorporates buying and selling linkages among regional industries. This analysis measures the impact generated by SNL expending money in the four central counties (Bernalillo, Sandoval, Tarrant, and Valencia) of New Mexico.

Several useful products of the I/O modeling technique are multipliers. Three multipliers, the



#### Legend

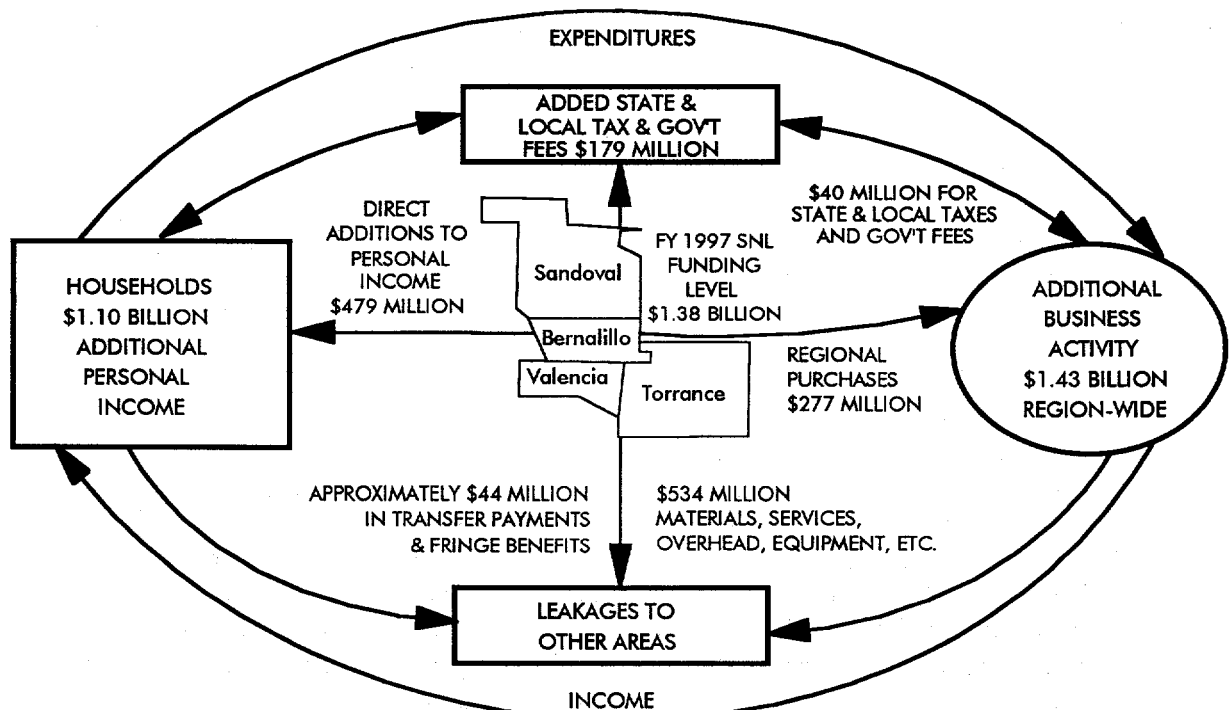


**Figure 3. SNL Expenditures in Central New Mexico by Major Sector, FY 1997.**

first related to general economic activity, the second to income, and the third to employment, provide information needed to estimate SNL's impact. The activity multiplier identifies the extent to which an activity, such as SNL, relies directly and indirectly on the regional economy to provide the materials, services, and labor it requires to conduct its activities. It also identifies the extent to which responding by businesses and industries occurs in the region. Income and employment multipliers make possible the identification of not only the direct impacts of an activity on income and jobs but also the indirect (business) and induced (household) effects.

#### Economic Impact of SNL

The flow diagram (Figure 4) charts the movement of monies spent by SNL. Expenditures for salaries and purchases go to households, regional businesses, and other regions (outside the state of New Mexico). This injection of money affects economic activity directly: the effect equals the amount funded for SNL efforts in central New Mexico (\$1.38 billion).



Total Regional Economic Impact -- \$4.09 Billion

**Figure 4. SNL Impact on Central New Mexico, FY 1997.**

Households and businesses affected by SNL respond much of the money they receive in the central four-county region, thus creating indirect and induced effects. In turn, businesses buy from other local firms and pay salaries to their employees, starting another round of spending. Every movement of money around the circle causes additional indirect (and induced) effects. However, some funds leak outside the region when purchases are made elsewhere and are not available for further local spending. Thus, indirect effects become smaller and smaller as continued respending occurs.

The initial spending by SNL generates substantial first-round impacts on households (net) and businesses (\$479 and \$277 million, respectively for FY 1997) in the four-county central New Mexico region (Figure 4). The initial spending will give government \$40 million in new revenues (mainly state and local government taxes, fees and government services). However, a large portion of the initial spending (\$534 million plus \$44 million in transfer payments and some fringe benefit costs) flows out of the region through leakages.

Respending by regional businesses and purchases by households and state and local government eventually bring the total impact on private business to about \$1.4 billion. Also, respending activity will continue to add to personal income and government revenues so that total personal income will increase to \$1.1 billion, and state and local government tax revenues, fees and government services will expand to \$179 million as a result of direct, indirect, and induced effects.

### Overall Impact

Using SNL's funding for its total operating and capital budget of slightly less than \$1.4 billion, econometric modeling techniques were used to calculate the effects of this funding. Table 3 gives the direct, indirect, induced, and total economic activity impact of SNL on the region. As Table 3 indicates, the total increase in economic activity in central New Mexico was nearly \$4.1 billion from this initial infusion of \$1.4 billion. The economic activity multiplier measures the volume of activity generated among various sectors of a region as a result of a \$1 exogenous change in a sector. For example, the regional economic activity multiplier for SNL for FY 1997 was 2.98. This indicates that

**Table 3. SNL Regional Influence on Central New Mexico's Economy, FY 1997.**

Economic Measure	FY 1997		
	SNL/New Mexico	Total Region	SNL as % of Region
- - -billions of dollars - - -			
<b>Economic Activity</b>			
Direct Expenditures	1.37		
Indirect and Induced (a)	2.72		
Total Economic Activity	4.09	44.4	9.2
Economic Activity Multiplier	2.98		
<b>Personal Income</b>			
Gross Labor Costs	0.52		
Net Wages and Salaries	0.48		
Indirect and Induced (a)	0.63		
Total Personal Income	1.11	14.4(a)	7.8
Personal Income Multiplier	2.32		
- - -number of employees- - -			
<b>Employment</b>			
Direct	7,442		
Indirect and Induced (a)	19,613		
Total Employment	27,055	363,192(b)	7.4
Employment Multiplier	3.64		

a. BEA April 1997 Preliminary.

b. NM Dept. of Labor, Table C, March 1998.

for every \$1 spent by SNL, another \$1.98 was generated in central New Mexico for a total impact of \$2.98 in FY 1997.

No official figure exists for total economic activity in the four-county central New Mexico region; however, for the purposes of this study total economic activity in the region is estimated at \$44.4 billion for FY 1997 (Table 3). This total impact of \$4.1 billion generated by SNL is about 9 percent of the estimated \$44.4 billion total economic activity in the region.

Table 9 in the Appendix gives SNL's indirect economic impacts on private and public sectors for FY 1997. The finance, insurance, and real estate (FIRE) sector received the greatest volume of indirect economic impacts, with about 17 percent of the total estimated private and public indirect impacts. Other sectors with large indirect economic impacts include retail trade (16 percent), automobile and other repair services (7 percent), other business services (6 percent), state government (6 percent), health, education, hotel, restaurant, and other services (5 percent), health,



education and social services (4 percent), and electric and gas utilities (4 percent).

### **Impact on Income**

Personal income is money that goes to individuals that are for purchases such as groceries, automobiles and gasoline, mortgage payments, medical, new shoes, taxes and savings. Most personal income consists of wages and salaries, although payments received as interest, rent, dividends, and social security benefits (payments to individuals) also count as personal income. Some of the fringe benefits and wages paid to employees are not counted in the current income stream (i.e., social security payments by employers and employees). In FY 1997, labor payments of \$523 million resulted in an estimated \$479 million in net additional personal income to the central New Mexico region.

Income multipliers measure the indirect and induced effects from new income generated from payment to labor by SNL. The income multiplier was 2.32 for FY 1997 (Table 3). Applying the income multiplier of 2.32 to the direct net personal income figure of \$479 million yields a total impact of slightly more than \$1.1 billion for income in the region resulting from SNL activity. This multiplier indicates that for every \$1 of personal income from SNL for labor, another \$1.32 is generated through indirect and induced effects, for a total impact on personal income of \$2.32.

In FY 1997, total personal income in central New Mexico was estimated at \$14.4 billion (Table 3). SNL activities in the central New Mexico region accounted for slightly less than 8 percent of total regional personal income in 1997.

### **Impact on Employment**

Beside this dollars-and-cents impact, SNL affects regional employment. In addition to the average of 7,442 mainly full-time jobs created by SNL in FY 1997, other jobs are supported by the resulting needs for goods and services and responding by individuals and businesses. Firms filling those needs have their own employees and in turn, spend money with other firms who must also hire people. In addition, each individual employee needs goods and services and helps support other jobs such as waitresses, mechanics, clerks, lawyers, and nurses.

The employment multipliers measure the average number of indirect and induced jobs supported, by SNL. The regional employment multiplier for SNL was estimated to be 3.64 in FY 1997 (Table 3). This indicates that for every 100 jobs created by SNL, another 264 jobs were supported in FY 1997, translating to a total impact of 27,055 jobs. These 27,055 jobs created or supported by SNL accounted for over 7 percent of total employment in the region in FY 1997.

Table 9 in the Appendix gives the SNL indirect employment impact on private and public sectors for FY 1997. The more labor-intensive sectors received the greater indirect employment impact. The retail trade sector had the largest indirect impact of about 27 percent of total private and public indirect impact. Other sectors with a large indirect employment impact include hotel, restaurant, and other personal services (12 percent), health, education and social services (7 percent), FIRE (11 percent), state government (6 percent), other business services (4 percent) and local government (4 percent).

## **CONCLUSIONS**

In summary, SNL operations in central New Mexico have a significant and positive influence on the economy of central New Mexico. The funding for SNL in central New Mexico was slightly less than \$1.4 billion in FY 1997, yielding a total economic impact of slightly less than \$4.1 billion or about 9 percent of the total economic activity in the region.

The total personal income impact was slightly more than \$1.1 billion in FY 1997 or about 8 percent of personal income derived in the four counties. The employment multiplier, 3.64 for the region, means that the 7,442 average employment level in FY 1997 resulted in a total impact of 27,055 jobs. In effect, nearly one of every 13 jobs in the region was created or supported by SNL. Approximately 77 percent of the jobs created indirectly by SNL in the region occurred in the trade, FIRE, and services sectors. Government sectors accounted for an additional 11 percent.

# **ECONOMIC IMPACTS OF SNL ON THE STATE OF NEW MEXICO, FY 1997**

## **Funding**

Throughout this chapter, funding to or expenditures by major on-site contractors or SNL offices will be referred to as "activities by SNL" for simplicity. The statewide total funding (operating and capital budget) for SNL for FY 1997 was slightly under \$1.4 billion (Table 4).

## **SNL Expenditure Patterns**

Total SNL instate expenditures (the initial respending of the total operating and capital budget) amounted to about 64 percent of the total budget in FY 1997 (Table 4). SNL total instate expenditures in New Mexico were \$887 million, primarily for salaries and wages, trade and services, capital equipment, and construction (Table 4).

Out-of-state purchases and salaries for those living elsewhere amounted to \$488 million. In addition, almost \$45 million for transfer payments and some fringe benefit costs for instate labor costs leaked directly out of state. The ten economic sectors accounting for the majority of SNL instate expenditures for FY 1997 were households (\$525 million), other business services (\$56 million), retail trade (\$40 million), government services (\$33 million), data processing and computer services (\$30 million), management, and consulting services (\$27 million), state government (\$27 million), construction (\$24 million), wholesale trade (\$24 million), engineering, architecture, and surveying services (\$18 million) and local government (\$17 million). These sectors combined accounted for nearly 93 percent of total instate SNL expenditures in FY 1997.

SNL expenditures by major sectors in New Mexico for FY 1997 were personnel including benefits (\$525 million), services (\$151 million), government (\$77 million), trade (\$64 million), construction (\$24 million), other sectors (\$24 million), and manufacturing (\$22 million) (Table 5). By far the largest expenditure by SNL in the state of New Mexico was labor (\$525 million), which is about 59 percent of the statewide expenditures (Table 5). Salaries and wages

**Table 4. SNL Expenditures (in dollars) in New Mexico by Sector and Total Operating Budget, FY 1997.**

Sector	FY 1997 Total State Expenditures (in dollars)
1. Livestock & Livestock Products	
2. Other Agricultural Products	
3. Forestry & Fishery Products	8,805
4. Agriculture, Forestry & Fishery Services	279,723
5. Mining, Crude Petroleum & Natural Gas	210,746
6. Construction	24,354,962
7. Ordnance & Chemical Manufacturing	90
8. Food & Kindred Products	
9. Textiles Products & Apparel Manufacturing	16,354
10. Lumber & Wood Products Manufacturing	300
11. Paper & Publishing Manufacturing	236,351
12. Petroleum Refining & Products Manufacturing	(1,442)
13. Glass, Stone & Clay Products Manufacturing	13,983
14. Primary & Fabricated Metals Manufacturing	2,318,190
15. Computer, Office & Service Equipment	16,438,809
16. Electrical Equipment Manufacturing	1,322,693
17. Scientific Instruments Manufacturing	923,406
18. All Other Manufacturing	413,154
19. Motor Freight Transportation & Warehousing	289,393
20. All Other Transportation	19,022
21. Communication	6,843,822
22. Electric & Gas Utilities	13,694,396
23. Water & Other Utilities	231,409
24. Wholesale Trade	24,381,969
25. Retail Trade	39,522,373
26. Finance, Insurance & Real Estate	1,972,382
27. Hotel Restaurant & Other Personal Services	840,254
28. Data Processing & Computer Services	29,801,559
29. Management & Consulting Services	27,074,858
30. Engin., Architecture & Surveying Services	17,930,261
31. Other Business Services	56,296,219
32. Automobile & Other Repair Services	4,035,273
33. Amusement, Recreation & Video Services	868,568
34. Health, Education & Social Services	14,611,527
35. Government Services	32,618,305
36. Local Government	17,326,532
37. State Government	26,785,799
38. Sandia National Laboratories (a)	
39. Households	525,096,541
Total New Mexico Expenditures	886,776,585
Total Operating and Capital Budget	1,375,011,764
Number of Employees	7,468

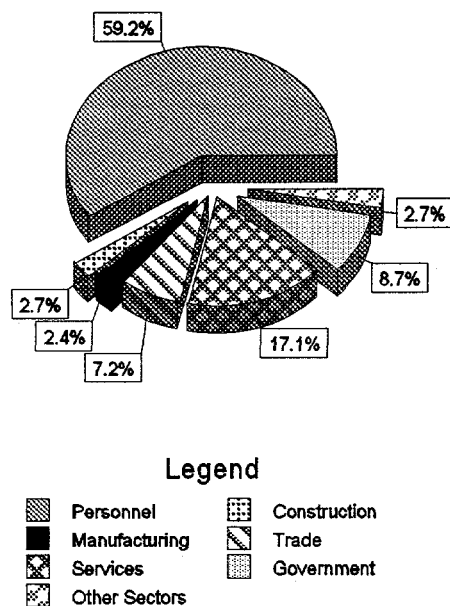
a. Any transfer of money for services or products between specified activities is counted only in the activity of the last receiving agency.

(without benefit costs) accounted for 48 percent of the total instate expenditures. In FY 1997, 17 percent of SNL expenditures went for services, 9 percent went to government, 7 percent for trade, 3 percent for construction, 3 percent other sectors, and 2 percent for manufacturing (Figure 5).

**Table 5. SNL Expenditures in New Mexico by Major Sector, FY 1997.**

Sector	FY 1997 thousands of dollars	(%)
I. Personnel		
A. Salaries & Wages	428,196	48.3
B. Benefits	<u>96,901</u>	<u>10.9</u>
Total	525,097	59.2
II. Construction	24,355	2.7
III. Manufacturing	21,682	2.4
IV. Trade	63,904	7.2
V. Services	151,459	17.1
VI. Government		
A. Local Government	17,327	2.0
B. State Government	26,786	3.0
C. Government Services	<u>32,618</u>	<u>3.7</u>
Total	76,731	8.7
VII. Other Sectors		
A. Agriculture	289	0.0
B. Mining	211	0.0
C. T.C.U. (a)	21,078	2.4
D. F.I.R.E. (b)	<u>1,972</u>	<u>0.2</u>
Total	23,550	2.7
<b>TOTAL EXPENDITURES</b>	<b><u>886,777</u></b>	<b><u>100.0</u></b>

a. Transportation, communication, and utilities.  
b. Finance, insurance, and real estate.



**Figure 5. SNL Expenditures in New Mexico by Major Sector, FY 1997.**

## Measuring Sandia National Laboratories Economic Impact on New Mexico

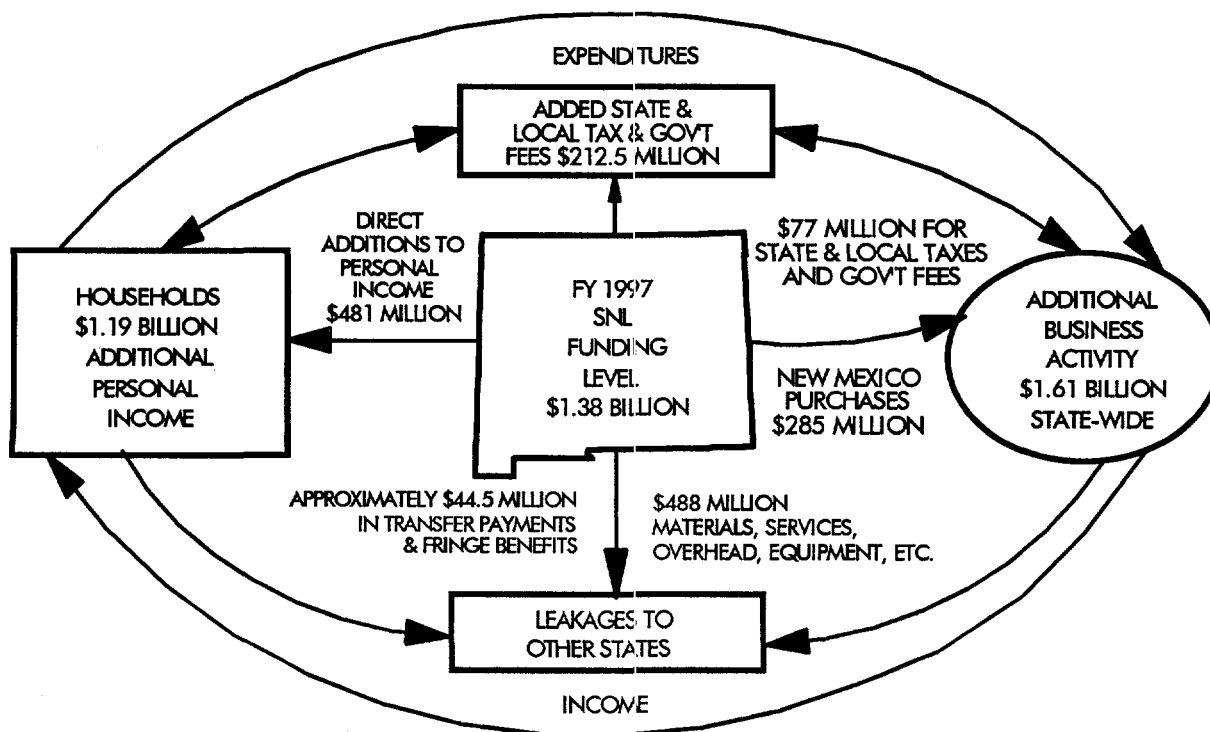
The analysis of SNL economic impact on the state of New Mexico employed an economic model that incorporates buying and selling linkages among regional industries. This analysis measures the impact generated by SNL, the DOE/AL contractor expending money in the state.

Several useful products of the I/O modeling technique are multipliers. Three multipliers, the first related to general economic activity, the second to income, and the third to employment, provide the information needed to estimate SNL's impact. The activity multiplier identifies the extent to which an activity such as SNL relies directly and indirectly on the state is economy to provide it with the materials, services, and labor it requires to conduct its activities. It also examines the extent to which responding by businesses and industries occurs in the state. Income and employment multipliers make it possible to identify not only the direct impacts of an activity on income and jobs, but also the indirect (business) and induced (household) effects.

### Economic Impact of SNL

The flow diagram (Figure 6) charts the movement of monies spent by SNL in the state of New Mexico. Expenditures for salaries and purchases go to households, statewide businesses, and other regions (outside the state of New Mexico). This injection of money affects economic activity directly, that is, the effect equals the amount allocated to SNL (\$1.4 billion).

Households and businesses affected by SNL respond much of the money they receive in the state, thus creating indirect (business) and induced (household) effects. In turn, businesses buy from other local firms and pay salaries to their employees, starting another round of spending. Every movement of money around the circle causes additional indirect (and induced) effects. However, some funds leak outside the region (state) when purchases are made elsewhere and are not available for further local spending. Thus, the indirect effects become



Total State-Wide Economic Impact -- \$4.39 Billion

**Figure 6. SNL Economic Impact on the State of New Mexico, FY 1997.**

smaller and smaller as continued respending occurs.

Initial spending by SNL generates substantial first-round impacts on households (net) and businesses (\$481 and \$285 million, respectively for FY 1997) in New Mexico (Figure 6). This initial spending will give government \$77 million in new revenues (mainly state and local taxes, fees and government services); however, a large portion of the initial spending (\$488 million, plus \$44 million in transfer payments and some fringe benefit costs) flows out of state through leakages.

Respending by instate businesses and purchases by households and state and local governments eventually bring the total impact on private business to about \$1.6 billion. Also, respending activity will continue to add to personal income and government revenues so that the total personal income effect will increase to almost \$1.2 billion, and state and local government tax revenues and government fees will expand \$213 million as a result of direct, indirect, and induced impacts.

#### Overall Impact

No official figure exists for total economic activity in the state; however, for this study, a 1997 estimate of \$91.2 billion is used (Table 6). While SNL is an important economic factor in central New Mexico, the economic impacts are important but less significant when measured on a statewide basis. SNL directly added slightly under \$1.4 billion to the total economy in FY 1997. The estimated indirect (and induced) impact of \$3.01 billion brings the total impact to nearly \$4.4 billion or about 5 percent of the estimated \$91.2 billion statewide total activity in 1997.

The estimated \$4.4 billion total economic impact in New Mexico from the initial infusion of \$1.4 billion is derived from I/O modeling techniques employed in the study. The modeling process produces estimated impacts from which multipliers can be determined. The economic activity multipliers are used to measure the volume of activity generated among various sectors as a result of a \$1 exogenous change in a sector.

**Table 6. SNL Influence on New Mexico's Economy, FY 1997.**

	FY 1997		SNL as
Economic Measure	SNL/New Mexico	Total State	% of State
- billions of dollars - -			
<b>Economic Activity</b>			
Direct Expenditures	1.38		
Indirect and Induced (a)	<u>3.01</u>		
Total Economic Activity	4.39	91.2	4.8
Economic Activity Multiplier	3.19		
<b>Personal Income</b>			
Gross Labor Costs	0.53		
Net Wages and Salaries	0.48		
Indirect and Induced (a)	<u>0.71</u>		
Total Personal Income	1.19	33.9(a)	3.5
Personal Income Multiplier	2.47		
number of employees			
<b>Employment</b>			
Direct	7,468		
Indirect and Induced (a)	<u>21,862</u>		
Total Employment	29,330	820,469(b)	3.6
Employment Multiplier	3.93		

a. BEA April 1997 Preliminary.

b. NM Dept. of Labor, Table C, March 1998.

For example, the economic activity multiplier for SNL for FY 1997 was 3.19. This indicates that for every \$1 spent by SNL or its major on-site contractors in New Mexico, another \$2.19 was generated, for a total impact of \$3.19 in FY 1997.

Appendix Table 10 gives SNL indirect economic impacts on private and public sectors for FY 1997. The retail trade sector received the greatest volume of indirect economic impacts, about 16 percent of the total estimated private and public sector volume of indirect impacts. Other sectors with large indirect impacts were FIRE (14 percent), other business services (7 percent), state government (6 percent), and health, education and social services (5 percent).

#### Impact on Income

Personal income is money that goes to individuals to be respent for items such as groceries, automobiles and gasoline, mortgage payments, medical, new shoes, taxes, and savings. Most personal income consists of wages and salaries, although payments received as interest, rent, dividends, and social security benefits (payments to individuals) also count as

personal income. Some of the fringe benefits and wages to employees are not counted in the current income stream (i.e., social security payments by employers and employees). In FY 1997, labor payments of \$525 million resulted in an estimated \$481 million in net additional personal income to the state.

Income multipliers measure the indirect and induced effects of new income generated from payment to labor by SNL. The statewide income multiplier was 2.47 for FY 1997 (Table 6). Application of the income multiplier of 2.47 to the direct net personal income figure of \$481 million yields a total impact of \$1.2 billion for income in the state resulting from SNL activity. This multiplier indicates that for every \$1 of personal income from SNL for labor, another \$1.47 is generated through indirect and induced effects, for a total impact on personal income of \$2.47.

In FY 1997, total personal income in New Mexico was estimated at \$33.9 million (Table 6). SNL activities in the New Mexico accounted for slightly more than 3.5 percent of total personal income in 1997.

#### Impact on Employment

Beside this dollars-and-cents impact, SNL affects statewide employment. In addition to the average of 7,468 mainly full-time jobs created by SNL in FY 1997, other jobs are supported by needs for goods and services and responding by individuals and businesses. Firms filling those needs have their own employees and, in turn, spend money with other firms who must also hire people. In addition, each individual employee needs goods and services and helps support other jobs such as waitresses, mechanics, clerks, lawyers, and nurses.

Employment multipliers measure the number of indirect and induced jobs supported, on the average, by SNL. The statewide employment multiplier for SNL was estimated to be 3.93 in FY 1997 (Table 6). This indicates that for every 100 jobs created by SNL, another 293 jobs were supported in FY 1997, for a total impact of 393 jobs. The total impact of 29,330 jobs created or supported by SNL accounted for slightly over

3.5 percent of total employment in the state in FY 1997 (see Table 6).

Table 10 in the Appendix gives SNL indirect employment impact on the private and public sectors for FY 1997. The more labor-intensive sectors received the greater indirect employment impact. The retail trade sector had the largest indirect impact, about 27 percent of the private and public indirect impact. Other sectors with a large indirect employment impact include hotel, restaurant and other services (11 percent), FIRE (9 percent), health, education and social services (8 percent), and state government (6 percent).

### CONCLUSIONS

In summary, SNL operations in New Mexico have a significant and positive influence on the economy of New Mexico. The funding for SNL in New Mexico, slightly under \$1.4 billion in FY 1997 supported a total economic impact of just less than \$4.4 billion or nearly 5 percent of total economic activity in the state.

Total personal income impacts were slightly over \$1.2 billion in FY 1997 or over 3.5 percent of personal income derived in the state. The employment multiplier was 3.93 for the state, meaning that the 7,468 average employment level in FY 1997 supported a total impact of 29,330. In effect, one of every 28 jobs in the state was created or supported by SNL. Approximately 75 percent of the jobs created indirectly by SNL in the state occurred in the trade, services, and FIRE sectors (Table 10). Government sectors accounted for an additional 11 percent.

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## APPENDIX

**Table 7. SNL Central New Mexico I/O Model Direct Coefficients, FY 1997.**

Sector	Direct Coefficients
1. Livestock & Livestock Products	0.000000
2. Other Agricultural Products	0.000000
3. Forestry & Fishery Products	0.000006
4. Agriculture, Forestry & Fishery Services	0.000203
5. Mining, Crude Petroleum & Natural Gas	0.000141
6. Construction	0.017709
7. Ordnance & Chemical Manufacturing	0.000000
8. Food & Kindred Products	0.000000
9. Textiles Products & Apparel Manufacturing	0.000010
10. Lumber & Wood Products Manufacturing	0.000000
11. Paper & Publishing Manufacturing	0.000172
12. Petroleum Refining & Products Manufacturing	-0.000001
13. Glass, Stone & Clay Products Manufacturing	0.000010
14. Primary & Fabricated Metals Manufacturing	0.001683
15. Computer, Office & Service Equipment Manuf.	0.011955
16. Electrical Equipment Manufacturing	0.000904
17. Scientific Instruments Manufacturing	0.000672
18. All Other Manufacturing	0.000298
19. Motor Freight Transportation & Warehousing	0.000211
20. All Other Transportation	0.000014
21. Communication	0.004977
22. Electric & Gas Utilities	0.009008
23. Water & Other Utilities	0.000174
24. Wholesale Trade	0.017587
25. Retail Trade	0.028549
26. Finance, Insurance & Real Estate	0.001327
27. Hotel Restaurant & Other Personal Services	0.000527
28. Data Processing & Computer Services	0.021632
29. Management & Consulting Services	0.019672
30. Engineering, Architecture & Surveying Services	0.013039
31. Other Business Services	0.039568
32. Automobile & Other Repair Services	0.002935
33. Amusement, Recreation & Video Services	0.000627
34. Health, Education & Social Services	0.007839
35. Government Services	0.016688
36. Local Government	0.012601
37. State Government	0.000000
38. Sandia National Laboratories	
39. Households	0.380556
Total New Mexico Expenditures	0.611293
Total Operating and Capital Budget	1.000000

**Table 8. SNL Statewide I/O Model Direct Coefficients, FY 1997.**

Sector	Direct Coefficients Coefficients
1. Livestock & Livestock Products	0.000000
2. Other Agricultural Products	0.000000
3. Forestry & Fishery Products	0.000006
4. Agriculture, Forestry & Fishery Services	0.000203
5. Mining, Crude Petroleum & Natural Gas	0.000153
6. Construction	0.017713
7. Ordnance & Chemical Manufacturing	0.000000
8. Food & Kindred Products	0.000000
9. Textiles Products & Apparel Manufacturing	0.000012
10. Lumber & Wood Products Manufacturing	0.000000
11. Paper & Publishing Manufacturing	0.000172
12. Petroleum Refining & Products Manufacturing	-0.000001
13. Glass, Stone & Clay Products Manufacturing	0.000010
14. Primary & Fabricated Metals Manufacturing	0.001686
15. Computer, Office & Service Equipment Manuf.	0.011955
16. Electrical Equipment Manufacturing	0.000962
17. Scientific Instruments Manufacturing	0.000672
18. All Other Manufacturing	0.000300
19. Motor Freight Transportation & Warehousing	0.000210
20. All Other Transportation	0.000014
21. Communication	0.004977
22. Electric & Gas Utilities	0.009959
23. Water & Other Utilities	0.000168
24. Wholesale Trade	0.017732
25. Retail Trade	0.028743
26. Finance, Insurance & Real Estate	0.001434
27. Hotel Restaurant & Other Personal Services	0.000611
28. Data Processing & Computer Services	0.021674
29. Management & Consulting Services	0.019691
30. Engineering, Architecture & Surveying Services	0.013040
31. Other Business Services	0.040942
32. Automobile & Other Repair Services	0.002935
33. Amusement, Recreation & Video Services	0.000632
34. Health, Education & Social Services	0.010626
35. Government Services	0.023722
36. Local Government	0.012601
37. State Government	0.019480
38. Sandia National Laboratories	
39. Households	0.381885
Total New Mexico Expenditures	0.644923
Total Operating and Capital Budget	1.000000

**Table 9. SNL, Central New Mexico, FY 1997, Indirect Volume Employment Impacts by Subsector.**

Sector	Volume		Employment	
	(\$000)	%	Jobs	%
1. Livestock and Livestock Products	6472.	0.4	17.	0.1
2. Other Agricultural Products	7980.	0.5	44.	0.2
3. Forestry and Fishery Products	393.	0.0	2.	0.0
4. Agricultural, Forestry, and Fishery Services	2027.	0.1	42.	0.2
5. Mining, Crude Petroleum, and Natural Gas	3938.	0.2	13.	0.1
6. Construction	69388.	4.3	783.	4.0
7. Ordnance & Chemical Manufacturing	3147.	0.2	19.	0.1
8. Food and kindred Products	26638.	1.7	134.	0.7
9. Textile Products and Apparel	5255.	0.3	56.	0.3
10. Lumber and Wood Products	1496.	0.1	16.	0.1
11. Paper and Publishing	8931.	0.6	101.	0.5
12. Petroleum Refining and Products	20200.	1.3	13.	0.1
13. Glass, Stone and Clay Products	5303.	0.3	52.	0.3
14. Primary and Fabricated Metals	3901.	0.2	34.	0.2
15. Computer, Office and Service equipment	13835.	0.9	81.	0.4
16. Electrical Equipment	28122.	1.7	143.	0.7
17. Scientific Instruments	2657.	0.2	16.	0.1
18. All Other Manufacturing	6903.	0.4	73.	0.4
19. Transportation and Warehousing	12571.	0.8	171.	0.9
20. All Other Transportation	14926.	0.9	180.	0.9
21. Communication	36896.	2.3	314.	1.6
22. Electric and Gas Utilities	66906.	4.2	95.	0.5
23. Water and Other Utilities	6915.	0.4	32.	0.2
24. Wholesale Trade	51970.	3.2	601.	3.1
25. Retail Trade	260813.	16.2	5298.	27.0
26. Finance, Insurance and Real Estate	276713.	17.2	2138.	10.9
27. Hotel Restaurant and Other Personal Services	83017.	5.2	2364.	12.1
28. Data Processing and Computer Services	18417.	1.1	165.	0.8
29. Management and Consulting Services	45828.	2.8	284.	1.4
30. Engineering and Related Services	38205.	2.4	315.	1.6
31. Other Business Services	87850.	5.5	864.	4.4
32. Automobile and Other Repair Services	110502.	6.9	1023.	5.2
33. Amusements, Recreation and Video Services	32211.	2.0	672.	3.4
34. Health, Education and Social Services	71447.	4.4	1322.	6.7
TOTAL Private Sector	1431771.	88.9	17478.	89.1
35. Government Services	27747.	1.7	299.	1.5
36. Local Government	54584.	3.4	719.	3.7
37. State Government	96503.	6.0	1116.	5.7
TOTAL Public Sector	178833.	11.1	2135.	10.9
TOTAL Private and Public Sectors	1610604.	100.0	19613.	100.0

Totals may not add due to rounding

**Table 10. SNL, State of New Mexico, FY 1997, Indirect Volume Employment Impacts by Subsector.**

Sector	Volume		Employment	
	(\$000)	%	Jobs	%
1. Livestock and Livestock Products	7565.	0.4	20.	0.1
2. Other Agricultural Products	8873.	0.5	49.	0.2
3. Forestry and Fishery Products	435.	0.0	2.	0.0
4. Agricultural, Forestry, and Fishery Services	2025.	0.1	42.	0.2
5. Mining, Crude Petroleum, and Natural Gas	49047.	2.7	167.	0.8
6. Construction	77079.	4.2	869.	4.0
7. Ordnance & Chemical Manufacturing	3025.	0.2	18.	0.1
8. Food and kindred Products	31768.	1.7	160.	0.7
9. Textile Products and Apparel	5527.	0.3	59.	0.3
10. Lumber and Wood Products	2458.	0.1	26.	0.1
11. Paper and Publishing	8578.	0.5	97.	0.4
12. Petroleum Refining and Products	37382.	2.1	25.	0.1
13. Glass, Stone and Clay Products	5132.	0.3	50.	0.2
14. Primary and Fabricated Metals	7825.	0.4	68.	0.3
15. Computer, Office and Service equipment	29088.	1.6	171.	0.8
16. Electrical Equipment	15140.	0.8	77.	0.4
17. Scientific Instruments	2400.	0.1	14.	0.1
18. All Other Manufacturing	6014.	0.3	64.	0.3
19. Transportation and Warehousing	13400.	0.7	182.	0.8
20. All Other Transportation	21248.	1.2	256.	1.2
21. Communication	45641.	2.5	389.	1.8
22. Electric and Gas Utilities	81854.	4.5	117.	0.5
23. Water and Other Utilities	9757.	0.5	45.	0.2
24. Wholesale Trade	78474.	4.3	907.	4.1
25. Retail Trade	292667.	16.1	5945.	27.2
26. Finance, Insurance and Real Estate	248417.	13.6	1919.	8.8
27. Hotel Restaurant and Other Personal Services	87818.	4.8	2501.	11.4
28. Data Processing and Computer Services	46718.	2.6	419.	1.9
29. Management and Consulting Services	44304.	2.4	274.	1.3
30. Engineering and Related Services	29505.	1.6	243.	1.1
31. Other Business Services	124472.	6.8	1225.	5.6
32. Automobile and Other Repair Services	63233.	3.5	585.	2.7
33. Amusements, Recreation and Video Services	33312.	1.8	695.	3.2
34. Health, Education and Social Services	90153.	4.9	1668.	7.6
TOTAL Private Sector	1610335.	88.3	19349.	88.5
35. Government Services	50771.	2.8	547.	2.5
36. Local Government	58240.	3.2	767.	3.5
37. State Government	103533.	5.7	1198.	5.5
TOTAL Public Sector	212544.	11.7	2512.	11.5
TOTAL Private and Public Sectors	1822879.	100.0	21862.	100.0

Totals may not add due to rounding