

**The Economic Impact of
Sandia National Laboratories
on Central New Mexico and the
State of New Mexico Fiscal Year 1998**

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August 9, 1999

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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 1998.

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 Steve Pazand, Unit Supervisor, Actuarial Research, NMDOL, made certain we obtained the detailed, but unpublished data needed for our research.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 financial officials who provided budget and expenditure data in a timely fashion, specifically Bonnie Apodaca and Pam Spicer from SNL's Controller Office. Also, we thank Daniel Garber, Laboratory Planning and Evaluation Department, SNL, who provided summarized achievement information. Last but not least, we also thank Irma Marshall, NMSU, for her assistance in typing the report.

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INTRODUCTION

Sandia National Laboratories (SNL) is a Department of Energy federally funded national security laboratory that uses engineering and science to ensure the security of the Nation. SNL provides scientific and engineering solutions to meet national needs in nuclear weapons and related defense systems, energy security, and environmental integrity. SNL works in partnerships with universities and industry to enhance their mission and transfer technology that will address emerging national challenges for both government and industry.

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 (I/O) 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 I/O model was rebased for FY 1998. 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 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 1998" report by Lansford, et al. (1999).

For this report, the reference period is FY 1998 (October 1, 1997, through September 30, 1998) and 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 (SNL)

History

SNL was established in 1949 to provide the engineering design, production, assembly, and field testing of non-nuclear components of nuclear bombs. SNL evolved into an engineering research and development laboratory by the early 1960s. During the 1970s, it became a multi-program national laboratory with responsibilities in national security, energy, and environmental research and development. SNL is operated for the U.S. Department of Energy by Sandia Corporation, a Lockheed Martin Company.

Background

SNL'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 SNL/New Mexico, is composed of five technical areas and an outdoor testing field covering 17,750 acres. This location benefits from its proximity to other major defense laboratories and testing facilitates and the emerging high-technology industrial climate in the Rio Grande research corridor. Another SNL complex in Livermore, California occupies 413 acres at the eastern edge of the San Francisco Bay area. SNL also operates test facilities in Nevada and Hawaii. At the end of Fiscal Year 1998 SNL provided 7,237 jobs in New Mexico and had a budget of approximately \$1.4 billion.

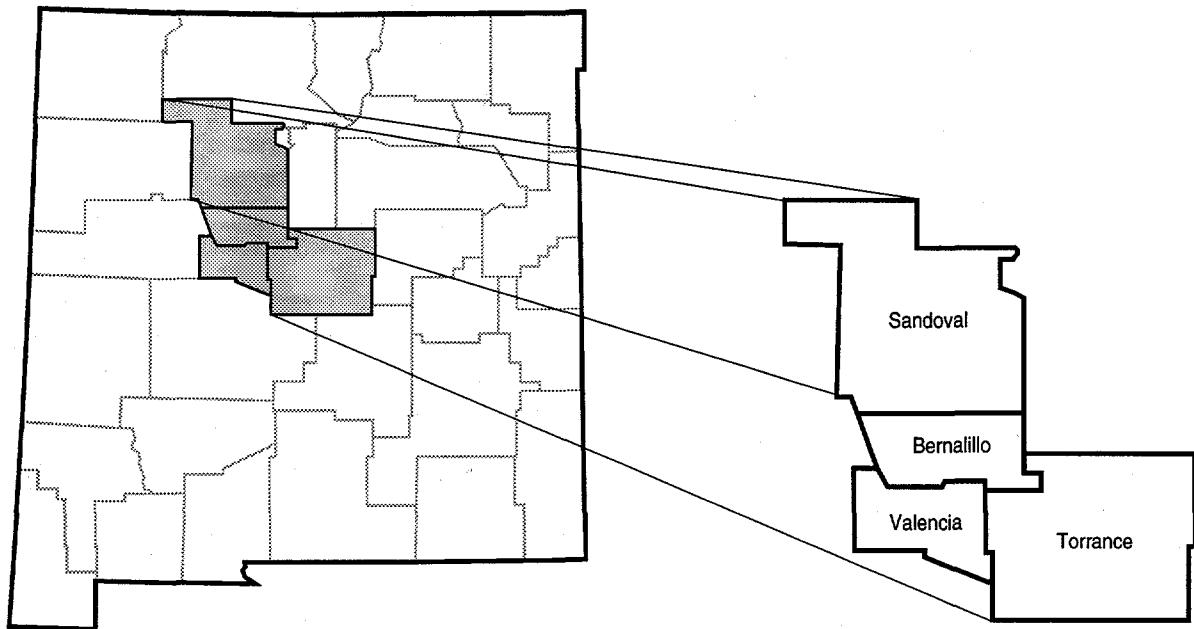


Figure 1. SNL Four-County Central New Mexico Region.

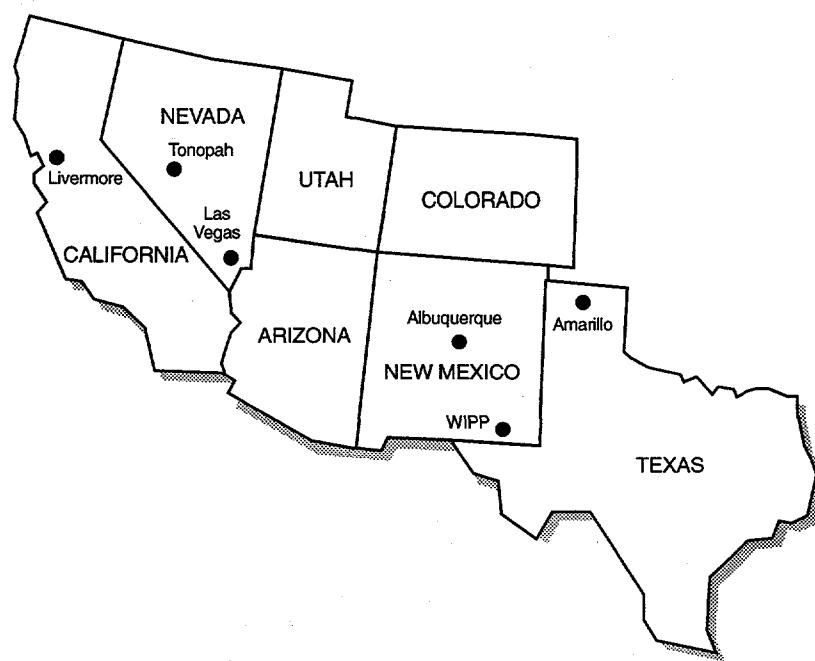


Figure 2. Location of SNL Facilities.

Missions and Capabilities

SNL has responsibility for the engineering development of all United States nuclear weapons and for systems integration of the nuclear weapons with their delivery vehicles. National security programs and defense-related environmental programs for the Department of Energy constitute approximately 65 percent of SNL's work. Responsibilities include the design, certification, and assessment of the non-nuclear subsystems of nuclear weapons; safety, security, reliability, and use-control; work 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 work in nuclear intelligence, nonproliferation, and treaty verification technologies. Approximately ten percent of SNL's work supports Department of Energy missions in energy science, research, and development. About 25 percent of SNL's work is for other government agencies, particularly the Department of Defense, in programs where SNL's unique competencies (based from mission responsibilities) can add value.

Recent Achievements

During Fiscal Year 1998, SNL:

- Retrofitted the existing B83-0 strategic bomb;
- Provided safety upgrades for the B61-3, -4, and -10 bombs;
- Retrofitted the B61 as an earth-penetrator (9B61-11) to replace the B53;
- Conducted a fire safety assessment of the W80 weapon;
- Provided neutron generator tubes;
- Developed a prototype microelectromechanical system lock;
- Developed a new vertical-cavity surface-emitting laser (VCSEL)-based detonator stronglink monitor prototype;
- Developed compliance monitors for the Comprehensive Test Ban Treaty.

- Upgraded nuclear security in the former Soviet Union;
- Developed COMRAD, a hand-held device to detect x- and gamma-rays to characterize and monitor radioactive materials;
- Demonstrated electron tunneling quantum transistors up to ten times faster than existing transistors;
- Developed new thin films for chemical warfare and microelectronics applications;
- Earned Environmental Protection Agency certification for the Waste Isolation Pilot Plant;
- Restarted the Annular Core Research Reactor to produce medical isotopes;
- Developed an explosives-detection portal for the Federal Aviation Administration;
- Nondestructively disabled the Unabomber's last bomb;
- Set a new record on the Z-Accelerator for temperature (290 terawatts) and x-ray output (applications include testing radiation effects on components); and
- Used the teraflops computer to model the impact of a 1.4-kilometer asteroid striking the Atlantic Ocean near New York City.

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 increasingly important. Energy programs are merging with the broader mission for the security of critical infrastructures. Environmental cleanup activities will continue with modest change. SNL will increasingly focus on core competencies for defense programs activities.

ECONOMIC IMPACTS OF SNL ON CENTRAL NEW MEXICO, FY 1998

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 1998 was slightly over \$1.4 billion (Table 1).

**Table 1. SNL Expenditures (in dollars) in
Central New Mexico by Sector
and Operating Budget,
FY 1998.**

Sector	Total Expenditures
1. Livestock & Livestock Products	
2. Other Agricultural Products	
3. Forestry & Fishery Products	
4. Agriculture, Forestry & Fishery Services	44,007
5. Mining, Crude Petroleum & Natural Gas	14,228
6. Construction	17,088,596
7. Ordnance & Chemical Manufacturing	2,255
8. Food & Kindred Products Manufacturing	
9. Textiles Products & Apparel Mfg.	8,317
10. Lumber & Wood Products Mfg.	
11. Paper & Publishing Manufacturing	650,193
12. Petroleum Refining & Products Mfg.	
13. Glass, Stone & Clay Products Mfg.	137,943
14. Primary & Fabricated Metals Mfg.	2,654,646
15. Computer, Office & Service Equipment Manufacturing	11,399,828
16. Electrical Equipment Manufacturing	4,471,258
17. Scientific Instruments Manufacturing	3,634,169
18. All Other Manufacturing	478,169
19. Motor Freight Transportation & Warehousing	223,687
20. All Other Transportation	6,795
21. Communication	7,933,118
22. Electric & Gas Utilities	14,666,951
23. Water & Other Utilities	647,637
24. Wholesale Trade	19,875,206
25. Retail Trade	41,877,194
26. Finance, Insurance & Real Estate	1,566,456
27. Hotel Restaurant & Other Personal Services	638,638
28. Data Processing & Computer Services	24,673,356
29. Management & Consulting Services	17,658,202
30. Engineering, Architecture & Surveying Services	18,338,479
31. Other Business Services	68,311,108
32. Automobile & Other Repair Services	4,915,984
33. Amusement, Recreation & Video Services	761,249
34. Health, Education & Social Services	10,918,004
35. Government Services	4,902,386
36. Local Government	18,368,556
37. State Government	4,162
38. Sandia National Laboratories	
39. Households	520,890,693
Total Regional Expenditures	817,761,469
Total Operating and Capital Budget	1,404,890,396
Number of Employees	7,207

This funding went for salaries and wages, trade and services, capital equipment, and construction.

SNL Expenditure Patterns

Total SNL regional expenditures (the initial responding of the total operating and capital budget) amounted to \$818 million or about 58 percent of the total budget in FY 1998 (Table 2). 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.

**Table 2. SNL Expenditures in Central
New Mexico by Major Sector,
FY 1998.**

Sector	thousands of dollars	Percent
I. Personnel		
A. Salaries & Wages	418,197	51.1
B. Benefits	102,693	12.6
Total	520,890	63.7
II. Construction	17,089	2.1
III. Manufacturing	23,437	2.9
IV. Trade	61,752	7.6
V. Services	146,215	17.9
VI. Government		
A. Local Government	18,369	2.2
B. State Government	4	0.0
C. Government Services	4,902	0.6
Total	23,275	2.8
VII. Other Sectors		
A. Agriculture	44	0.0
B. Mining	14	0.0
C. T.C.U.(a)	23,478	2.9
D. F.I.R.E.(b)	1,566	0.2
Total	25,102	3.1
TOTAL EXPENDITURES	817,760	100.0

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

The ten economic sectors accounting for the majority of SNL regional expenditures for FY 1998 were: households (\$521 million); other business services (\$68 million); retail trade (\$42 million); data processing and computer services (\$25 million); wholesale trade (\$20 million); management and consulting services (\$18 million); local government (\$18 million); engineering, architecture and surveying services

(\$18 million); construction (\$17 million); and electric and gas utilities (\$15 million). These ten sectors combined accounted for about 94 percent of total SNL regional expenditures.

SNL expenditures by major sectors in Central New Mexico for FY 1998 were: personnel, including benefits (\$521 million); services (\$146 million); trade (\$62 million); other sectors (\$25 million); total government (\$23 million); manufacturing (\$23 million); and construction (\$17 million) (Table 2). By far, the largest SNL expenditure in Central New Mexico was labor, almost 64 percent of the total regional expenditures. In FY 1998, 18 percent of the SNL regional expenditures went for services, almost 8 percent for trade, almost 3 percent for government, 3 percent for other sectors, 3 percent for manufacturing, and 2 percent for construction, (Figure 3). The Sandia Corporation, managers of SNL, had approximately 7,207 employees in Central New Mexico in FY 1998.

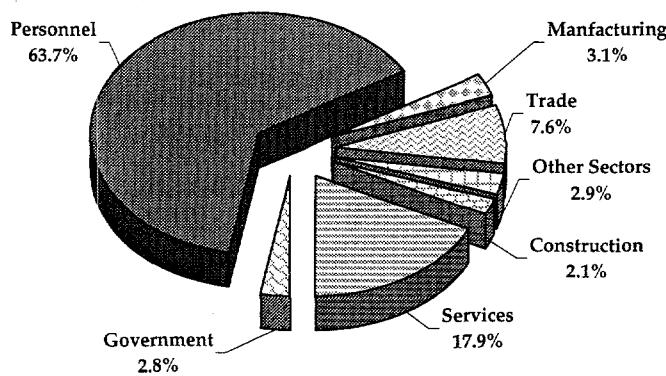


Figure 3. SNL Expenditures in Central New Mexico by Major Sector, FY 1998.

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, Torrance, and Valencia) of New Mexico.

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 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 impacts (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 (\$1.4 billion).

Households and businesses affected by SNL respond much of the money they receive in the four-county Central New Mexico 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 responding occurs.

The initial spending by SNL generates substantial first-round impacts on households (net) and businesses (\$477 and \$274 million, respectively for FY 1998) in the four-county Central New Mexico Region (Figure 4). The initial spending will give government \$23

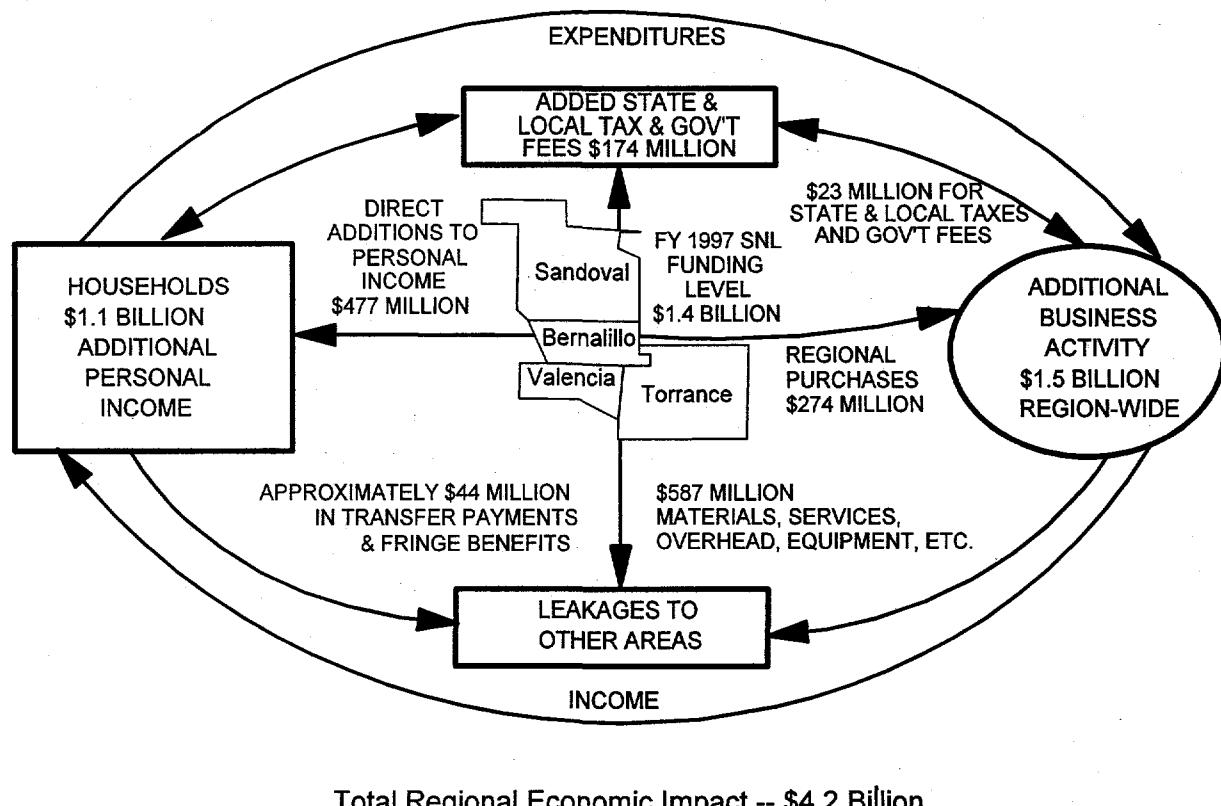


Figure 4. SNL Economic Impact on Central New Mexico, FY 1998.

million in new revenues (mainly state and local government taxes, fees and government services). However, a large portion of the initial spending (\$587 million plus \$44 million in transfer payments and some fringe benefit costs) flows out of the region through leakages.

Responding by regional businesses and purchases by households and state and local government eventually brings the total impact on private business to nearly \$1.5 billion. Also, responding activity will continue to add to personal income and government revenues so that total personal income will increase to slightly over \$1.1 billion, and state and local government tax revenues, fees and government services will expand to \$174 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 more 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 \$4.2 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 1998, was 2.98. This indicates that for every \$1 spent by SNL another \$1.98 was generated in Central New Mexico for a total impact of \$2.98 in FY 1998.

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 \$47 billion for FY 1998 (Table 3). This total impact of \$4.2 billion generated by SNL is about 9 percent of the estimated \$47 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 1998. The retail trade sector received the

Table 3. SNL Regional Influence on Central New Mexico's Economy, FY 1998.

Economic Measure	SNL/New Mexico	Total Region	SNL as % of Region
- - billions of dollars - -			
Economic Activity			
Direct Expenditures	1.40		
Indirect and Induced (a)	2.79		
Total Economic Activity	4.19	47	8.9
Economic Activity Multiplier	2.98		
- - number of employees - -			
Personal Income			
Gross Labor Costs	0.52		
Net Wages and Salaries	0.48		
Indirect and Induced (a)	0.66		
Total Personal Income	1.14	15.7(a)	7.2
Personal Income Multiplier	2.38		
Employment			
Direct	7,207		
Indirect and Induced (a)	20,386		
Total Employment	27,593	368,082(b)	7.5
Employment Multiplier	3.83		

a. BEA May 1999

b. NM Dept. of Labor, Table C, March 1999.

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: finance, insurance, and real estate (FIRE) sector (15 percent); other business services (9 percent); state government (6 percent); health, education, hotel, restaurant, and other services (5 percent); health, education and social services (5 percent); electric and gas utilities (4 percent); and wholesale trade (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, clothing and 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 1998,

labor payments of \$521 million resulted in an estimated \$477 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 2.38 for FY 1998 (Table 3). Applying the income multiplier of 2.38 to the direct net personal income figure of \$477 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 \$1.38 is generated through indirect and induced effects, for a total impact on personal income of \$2.38.

In FY 1998, total personal income in Central New Mexico was estimated at nearly \$16 billion (Table 3). SNL activities in the Central New Mexico Region accounted for slightly more than 7 percent of total regional personal income in 1998.

Impact on Employment

Beside this dollars-and-cents impact, SNL affects regional employment. In addition to the average of 7,207 mainly full-time jobs created by SNL in FY 1998, 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 3.83 in FY 1998 (Table 3). This indicates that for every 100 jobs created by SNL, another 283 jobs were supported in FY 1998, translating to a total impact of 27,593 jobs. These 27,593 jobs created or supported by SNL accounted for over 7 percent of total employment in the region in FY 1998. Table 9 in the Appendix gives the SNL indirect employment impact on private and public sectors for FY 1998. The more

labor-intensive sectors received the greater indirect employment impact. The retail trade sector had the largest indirect impact of about 28 percent of total private and public indirect impact. Other sectors with a large indirect employment impact include: hotel, restaurant, and other personal services (11 percent); FIRE (9 percent); health, education and social services (8 percent); other business services (7 percent); state government (6 percent); and wholesale trade and local government (4 percent each).

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 more than \$1.4 billion in FY 1998, yielding a total economic impact of slightly less than \$4.2 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 1998 or about 7 percent of personal income derived in the four counties. The employment multiplier, 3.83 for the region, means that the 7,207 average employment level in FY 1998 resulted in a total impact of 27,593 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 9 percent.

ECONOMIC IMPACTS OF SNL ON THE STATE OF NEW MEXICO, FY 1998

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 1998 was slightly more than \$1.4 billion (Table 4).

SNL Expenditure Patterns

Total SNL instate expenditures (the initial responding of the total operating and capital budget) amounted to about 61 percent of the total budget in FY 1998 (Table 4). SNL's total instate expenditures in New Mexico were \$852 million, primarily for salaries and wages, trade and services, capital equipment, and construction (Table 4).

Table 4. SNL Expenditures (in dollars) in New Mexico by Sector and Operating Budget, FY 1998.

Sector	Total Expenditures
1. Livestock & Livestock Products	
2. Other Agricultural Products	
3. Forestry & Fishery Products	
4. Agriculture, Forestry & Fishery Services	44,007
5. Mining, Crude Petroleum & Natural Gas	24,544
6. Construction	17,088,596
7. Ordnance & Chemical Manufacturing	2,255
8. Food & Kindred Products Manufacturing	
9. Textile Products & Apparel Manufacturing	11,620
10. Lumber & Wood Products Manufacturing	
11. Paper & Publishing Manufacturing	650,593
12. Petroleum Refining & Products Mfg.	
13. Glass, Stone & Clay Products Manufacturing	143,651
14. Primary & Fabricated Metals Manufacturing	2,654,646
15. Computer, Office & Service Equipment Mfg.	11,413,252
16. Electrical Equipment Manufacturing	4,724,351
17. Scientific Instruments Manufacturing	3,655,169
18. All Other Manufacturing	478,169
19. Motor Freight Transportation & Warehousing	241,498
20. All Other Transportation	6,795
21. Communication	7,930,798
22. Electric & Gas Utilities	14,666,951
23. Water & Other Utilities	647,637
24. Wholesale Trade	19,903,758
25. Retail Trade	42,532,238
26. Finance, Insurance & Real Estate	1,652,006
27. Hotel Restaurant & Other Personal Services	681,309
28. Data Processing & Computer Services	24,749,423
29. Management & Consulting Services	20,502,358
30. Engineering, Architecture & Surveying Services	18,347,967
31. Other Business Services	69,598,606
32. Automobile & Other Repair Services	5,563,326
33. Amusement, Recreation & Video Services	764,355
34. Health, Education & Social Services	11,294,868
35. Government Services	5,047,413
36. Local Government	18,368,556
37. State Government	26,026,101
38. Sandia National Laboratories	
39. Households	523,058,982
Total New Mexico Expenditures	852,475,799
Total Operating and Capital Budget	1,404,890,396
Number of Employees	7,237

Out-of-state purchases and salaries for those living elsewhere amounted to \$552 million. In addition, over \$44 million for transfer payments and some fringe benefit costs for instate labor costs leaked directly out of state. The eleven economic sectors accounting for the majority of SNL instate expenditures for FY 1998 were: households (\$523 million); other business services (\$70 million); retail trade (\$43 million); state government (\$26 million); data processing and computer services (\$25 million); management, and consulting services (\$21 million); wholesale trade (\$20 million); engineering, architecture, and surveying services (\$18 million); local government (\$18 million); construction (\$17 million); and electric and gas utilities (\$15 million). These sectors combined accounted for nearly 93 percent of total instate SNL expenditures, in FY 1998.

SNL expenditures by major sectors in New Mexico for FY 1997 were: personnel including benefits (\$523 million); services (\$152 million); trade (\$62 million); total government (\$49 million); other sectors (\$25 million); manufacturing (\$24 million) and construction (\$17 million) (Table 5). By far the largest expenditure by SNL in the state of New Mexico was labor (\$523 million), which is about 61 percent of the statewide expenditures (Table 5). Salaries and wages (without benefit costs) accounted for 49 percent of the total instate expenditures. In FY 1998, 18 percent of SNL expenditures went for services, 7 percent for trade, 6 percent went to government, 3 percent other sectors, 3 percent for manufacturing, and 2 percent for construction, (Figure 5).

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's 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.

Table 5. SNL Expenditures in New Mexico by Major Sector, FY 1998.

Sector	thousands of dollars	Percent
I. Personnel		
A. Salaries & Wages	419,939	49.3
B. Benefits	103,120	12.1
Total	523,059	61.4
II. Construction	17,089	2.0
III. Manufacturing	23,734	2.8
IV. Trade	62,436	7.3
V. Services	151,502	17.8
VI. Government		
A. Local Government	18,369	2.2
B. State Government	26,026	3.1
C. Government Svcs.	5,047	0.6
Total	49,442	5.8
VII. Other Sectors		
A. Agriculture	44	0.0
B. Mining	25	0.0
C. T.C.U.(a)	23,494	2.8
D. F.I.R.E.(b)	1,652	0.2
Total	25,214	3.0
TOTAL EXPENDITURES	852,476	100.0

a. Transportation, communication, and utilities.

b. Finance, insurance, and real estate.

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).

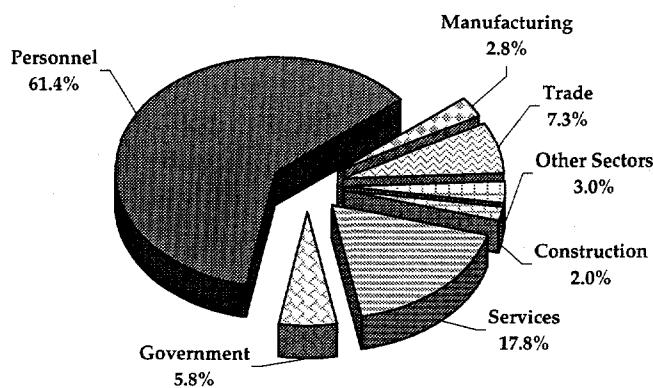


Figure 5. SNL Expenditures in New Mexico by Major Sector, FY 1998.

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 smaller and smaller as continued responding occurs.

Initial spending by SNL generates substantial first-round impacts on households (net) and businesses (\$479 and \$280 million, respectively for FY 1998) in New Mexico (Figure 6). This initial spending will give government \$49 million in new revenues (mainly state and local taxes, fees and government services); however, a large portion of the initial spending (\$552 million, plus \$44 million in transfer payments and some fringe benefit costs) flows out of state through leakages.

Responding by instate businesses and purchases by households and state and local governments eventually bring the total impact on private business to about \$1.7 billion. Also, responding activity will continue to add to personal income and government revenues so that the total personal income effect will increase to over \$1.2 billion, and state and local government tax revenues and government fees will expand \$200 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 1998 estimate of \$96.5 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 over \$1.4 billion to the total economy in FY 1998. The estimated indirect (and induced) impact of \$3.1 billion brings the total impact to over \$4.5 billion or about 5 percent of the estimated \$96.5 billion statewide total activity in 1998.

The estimated \$4.5 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.

For example, the economic activity multiplier for SNL for FY 1998 was 3.22. This indicates that for every \$1 spent by SNL or its major on-site contractors in New Mexico, another \$2.22 was generated, for a total impact of \$3.22 in FY 1998.

Appendix Table 10 gives SNL's indirect economic impacts on private and public sectors for FY 1998. 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 (8

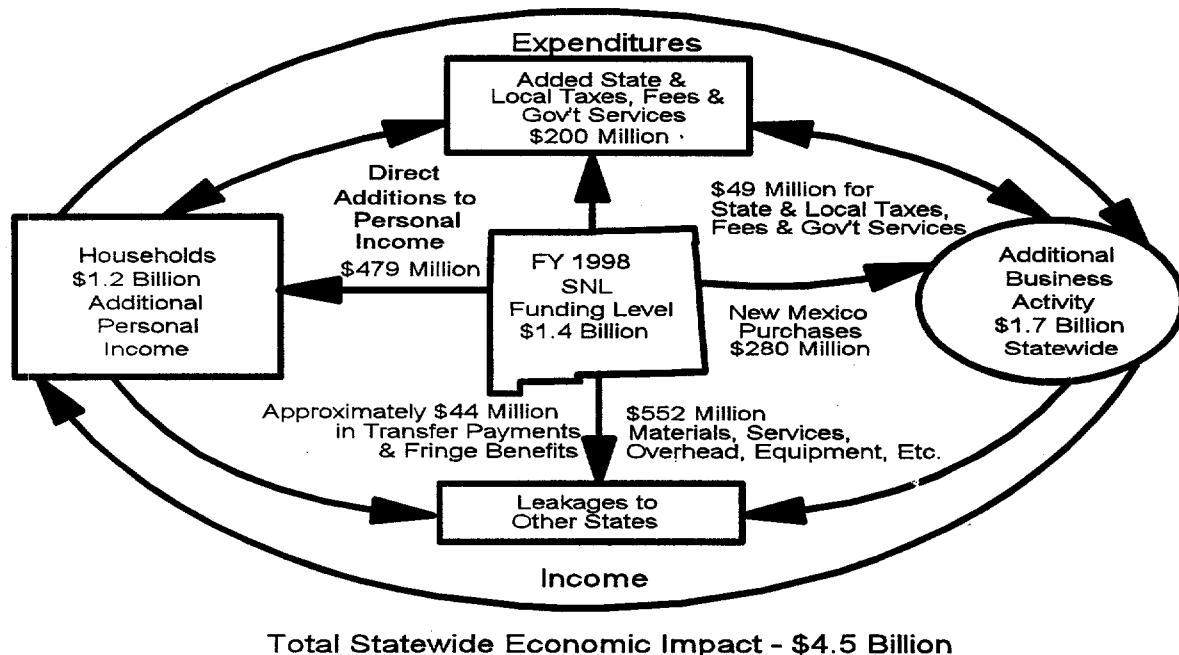


Figure 6. SNL Economic Impact on the State of New Mexico, FY 1998.

percent), health, education and social services (7 percent), and state government (6 percent).

Impact on Income

Personal income is money that goes to individuals to be spent for items such as groceries, automobiles and gasoline, mortgage payments, medical, clothing and 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 1998, labor payments of \$523 million resulted in an estimated \$479 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 2.54 for FY 1998 (Table 6). Application of the income multiplier of 2.54 to the direct net personal income figure of \$479 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 \$1.54 is generated through indirect and induced effects, for a total impact on personal income of \$2.54.

In FY 1998, total personal income in New Mexico was estimated at \$34.6 million (Table 6). SNL activities in the state of New Mexico accounted for slightly more than 3.5 percent of total personal income in 1998.

Impact on Employment

Beside this dollars-and-cents impact, SNL affects statewide employment. In addition to the average of 7,237 mainly full-time jobs created by SNL in FY 1998, 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 4.18 in FY 1998 (Table 6). This indicates that for every 100 jobs created by SNL, another 318 jobs were

Table 6. SNL Influence on New Mexico's Economy, FY 1998.

Economic Measure	SNL/New Mexico	Total State	SNL as % of State
- billions of dollars -			
Economic Activity			
Direct Expenditures	1.40		
Indirect and Induced (a)	3.11		
Total Economic Activity	4.52	96.5	4.7
Economic Activity Multiplier	3.22		
Personal Income			
Gross Labor Costs	0.53		
Net Wages and Salaries	0.48		
Indirect and Induced (a)	0.74		
Total Personal Income	1.22	34.6(a)	3.5
Personal Income Multiplier	2.54		
number of employees			
Employment			
Direct	7,237		
Indirect and Induced (a)	23,041		
Total Employment	30,278	831,052(b)	3.6
Employment Multiplier	4.18		

a. BEA May 1999
b. NM Dept. of Labor, Table C, March 1999.

supported in FY 1998, for a total impact of 418 jobs. The total impact of 30,278 jobs created or supported by SNL accounted for slightly over 3.6 percent of total employment in the state in FY 1998 (see Table 6).

Table 10 in the Appendix gives SNL indirect employment impact on the private and public sectors for FY 1998. 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); health, education and social services (11 percent); FIRE (9 percent); other business services (6 percent); and state government (5 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 over \$1.4 billion in FY 1998 supported a total economic impact of just more than \$4.5 billion or nearly 5 percent of total economic activity in the state.

Total personal income impacts were slightly over \$1.2 billion in FY 1998 or over 3.5 percent of personal income derived in the state. The employment multiplier was 4.18 for the state, meaning that the 7,237 average employment level in FY 1998 supported a total impact of 30,278. In effect, one of every 28 jobs in the state was created or supported by SNL. Approximately 77 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 9 percent.

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APPENDIX

Table 7. SNL Central New Mexico I/O Model Direct Coefficients, FY 1998

Sector	Direct Coefficients
1. Livestock & Livestock Products	0.000000
2. Other Agricultural Products	0.000000
3. Forestry & Fishery Products	0.000000
4. Agriculture, Forestry & Fishery Services	0.000031
5. Mining, Crude Petroleum & Natural Gas	0.000010
6. Construction	0.012164
7. Ordnance & Chemical Manufacturing	0.000002
8. Food & Kindred Products Manufacturing	0.000000
9. Textiles Products & Apparel Manufacturing	0.000006
10. Lumber & Wood Products Manufacturing	0.000000
11. Paper & Publishing Manufacturing	0.000463
12. Petroleum Refining & Products Manufacturing	0.000000
13. Glass, Stone & Clay Products Manufacturing	0.000098
14. Primary & Fabricated Metals Manufacturing	0.001890
15. Computer, Office & Service Equipment Manufacturing	0.008114
16. Electrical Equipment Manufacturing	0.003183
17. Scientific Instruments Manufacturing	0.002587
18. All Other Manufacturing	0.000340
19. Motor Freight Transportation & Warehousing	0.000159
20. All Other Transportation	0.000005
21. Communication	0.005647
22. Electric & Gas Utilities	0.010440
23. Water & Other Utilities	0.000461
24. Wholesale Trade	0.014147
25. Retail Trade	0.029808
26. Finance, Insurance & Real Estate	0.001115
27. Hotel Restaurant & Other Personal Services	0.000455
28. Data Processing & Computer Services	0.017562
29. Management & Consulting Services	0.012569
30. Engineering, Architecture & Surveying Services	0.013053
31. Other Business Services	0.048624
32. Automobile & Other Repair Services	0.003499
33. Amusement, Recreation & Video Services	0.000542
34. Health, Education & Social Services	0.007771
35. Government Services	0.003490
36. Local Government	0.013075
37. State Government	0.000003
38. Sandia National Laboratories	0.000000
39. Households	0.370770
 Total New Mexico Expenditures	 0.582082
<u>Total Operating and Capital Budget</u>	<u>1.000000</u>

Table 8. SNL Statewide I/O Model, Direct Coefficients, FY 1998

Sector	Direct Coefficients
1. Livestock & Livestock Products	0.000000
2. Other Agricultural Products	0.000000
3. Forestry & Fishery Products	0.000000
4. Agriculture, Forestry & Fishery Services	0.000031
5. Mining, Crude Petroleum & Natural Gas	0.000017
6. Construction	0.012164
7. Ordnance & Chemical Manufacturing	0.000002
8. Food & Kindred Products Manufacturing	0.000000
9. Textiles Products & Apparel Manufacturing	0.000008
10. Lumber & Wood Products Manufacturing	0.000000
11. Paper & Publishing Manufacturing	0.000463
12. Petroleum Refining & Products Manufacturing	0.000000
13. Glass, Stone & Clay Products Manufacturing	0.000102
14. Primary & Fabricated Metals Manufacturing	0.001889
15. Computer, Office & Service Equipment Manuf.	0.008124
16. Electrical Equipment Manufacturing	0.003363
17. Scientific Instruments Manufacturing	0.002602
18. All Other Manufacturing	0.000340
19. Motor Freight Transportation & Warehousing	0.000172
20. All Other Transportation	0.000005
21. Communication	0.005645
22. Electric & Gas Utilities	0.010440
23. Water & Other Utilities	0.000461
24. Wholesale Trade	0.014167
25. Retail Trade	0.030274
26. Finance, Insurance & Real Estate	0.001176
27. Hotel Restaurant & Other Personal Services	0.000485
28. Data Processing & Computer Services	0.017617
29. Management & Consulting Services	0.014594
30. Engineering, Architecture & Surveying Services	0.013060
31. Other Business Services	0.049540
32. Automobile & Other Repair Services	0.003960
33. Amusement, Recreation & Video Services	0.000544
34. Health, Education & Social Services	0.008040
35. Government Services	0.003593
36. Local Government	0.013075
37. State Government	0.018525
38. Sandia National Laboratories	0.000000
39. Households	0.372313
Total New Mexico Expenditures	0.606792
<u>Total Operating and Capital Budget</u>	<u>1.000000</u>

Table 9. Indirect Volume and Employment Impacts by Sector, SNL, Central New Mexico, FY 1998

Sector	Volume		Employment	
	(\$000)	%	Jobs	%
1. Livestock and Livestock Products	6680.	0.4	18.	0.1
2. Other Agricultural Products	8135.	0.5	45.	0.2
3. Forestry and Fishery Products	390.	0.0	2.	0.0
4. Agricultural, Forestry, and Fishery Services	1857.	0.1	39.	0.2
5. Mining, Crude Petroleum, and Natural Gas	4593.	0.3	16.	0.1
6. Construction	62262.	3.9	702.	3.4
7. Ordnance and Chemical Manufacturing	2656.	0.2	16.	0.1
8. Food and Kindred Products Manufacturing	28229.	1.7	143.	0.7
9. Textile Products and Apparel Manufacturing	5965.	0.4	64.	0.3
10. Lumber and Wood Products Manufacturing	1405.	0.1	15.	0.1
11. Paper and Publishing Manufacturing	11105.	0.7	126.	0.6
12. Petroleum Refining and Products Manufacturing	20384.	1.2	14.	0.1
13. Glass, Stone and Clay Products Manufacturing	5388.	0.3	53.	0.3
14. Primary and Fabricated Metals Manufacturing	6821.	0.4	59.	0.3
15. Computer, Office and Service Equipment Mfg.	23998.	1.4	141.	0.7
16. Electrical Equipment Manufacturing	18069.	1.2	92.	0.5
17. Scientific Instruments Manufacturing	5375.	0.3	32.	0.2
18. All Other Manufacturing	6791.	0.4	72.	0.4
19. Motor Freight Transportation and Warehousing	13440.	0.8	183.	0.9
20. All Other Transportation	14975.	0.9	180.	0.9
21. Communication	47021.	2.8	401.	2.0
22. Electric and Gas Utilities	73248.	4.5	104.	0.5
23. Water and Other Utilities	7568.	0.5	35.	0.2
24. Wholesale Trade	73485.	4.4	849.	4.2
25. Retail Trade	283321.	17.1	5755.	28.2
26. Finance, Insurance and Real Estate	241351.	14.6	1864.	9.1
27. Hotel Restaurant and Other Personal Services	80168.	4.8	2283.	11.2
28. Data Processing and Computer Services	44461.	2.7	398.	2.0
29. Management and Consulting Services	33626.	2.0	208.	1.0
30. Engineering, Architecture and Surveying Services	28200.	1.7	232.	1.1
31. Other Business Services	142690.	8.6	1404.	6.9
32. Automobile and Other Repair Services	61892.	3.7	573.	2.8
33. Amusement, Recreation and Video Services	30600.	1.8	639.	3.1
34. Health, Education and Social Services	83440.	5.0	1544.	7.6
TOTAL Private Sector	1479588.	89.5	18300.	89.8
35. Government Services	22242.	1.3	240.	1.2
36. Local Government	55860.	3.4	736.	3.6
37. State Government	96008.	5.8	1111.	5.4
TOTAL Public Sector	174109.	10.5	2086.	10.2
TOTAL Private and Public Sectors	1653697.	100.	20386.	100.0

Totals may not add due to rounding

Table 10. Indirect Volume and Employment Impacts by Sector, SNL, State of New Mexico, FY 1998

Sector	Volume		Employment	
	(\$000)	%	Jobs	%
1. Livestock and Livestock Products	7916.	0.4	21.	0.1
2. Other Agricultural Products	9151.	0.5	51.	0.2
3. Forestry and Fishery Products	441.	0.0	2.	0.0
4. Agricultural, Forestry, and Fishery Services	1878.	0.1	39.	0.2
5. Mining, Crude Petroleum, and Natural Gas	46342.	2.4	157.	0.7
6. Construction	69971.	3.7	789.	3.4
7. Ordnance and Chemical Manufacturing	2947.	0.2	17.	0.1
8. Food and Kindred Products Manufacturing	34147.	1.8	172.	0.7
9. Textile Products and Apparel Manufacturing	6239.	0.3	67.	0.3
10. Lumber and Wood Products Manufacturing	2469.	0.1	26.	0.1
11. Paper and Publishing Manufacturing	10582.	0.6	120.	0.5
12. Petroleum Refining and Products Manufacturing	36392.	1.9	24.	0.1
13. Glass, Stone and Clay Products Manufacturing	5082.	0.3	50.	0.2
14. Primary and Fabricated Metals Manufacturing	8605.	0.5	75.	0.3
15. Computer, Office and Service Equipment Mfg.	24402.	1.3	143.	0.6
16. Electrical Equipment Manufacturing	18575.	1.0	94.	0.4
17. Scientific Instruments Manufacturing	5608.	0.3	33.	0.1
18. All Other Manufacturing	6766.	0.4	72.	0.3
19. Motor Freight Transportation and Warehousing	14588.	0.8	199.	0.9
20. All Other Transportation	21861.	1.2	263.	1.1
21. Communication	49867.	2.6	425.	1.8
22. Electric and Gas Utilities	84405.	4.5	120.	0.5
23. Water and Other Utilities	10551.	0.6	49.	0.2
24. Wholesale Trade	78679.	4.2	910.	3.9
25. Retail Trade	301895.	15.9	6133.	26.6
26. Finance, Insurance and Real Estate	259589.	13.7	2005.	8.7
27. Hotel Restaurant and Other Personal Services	87000.	4.6	2477.	10.8
28. Data Processing and Computer Services	42192.	2.2	378.	1.6
29. Management and Consulting Services	36178.	1.9	224.	1.0
30. Engineering, Architecture and Surveying Services	29451.	1.6	242.	1.1
31. Other Business Services	144456.	7.6	1421.	6.2
32. Automobile and Other Repair Services	66711.	3.5	618.	2.7
33. Amusement, Recreation and Video Services	35014.	1.8	731.	3.2
34. Health, Education and Social Services	135600.	7.2	2509.	10.9
TOTAL Private Sector	1695544.	89.5	20658.	89.7
35. Government Services	31077.	1.6	335.	1.5
36. Local Government	60818.	3.2	801.	3.5
37. State Government	107830.	5.7	1247.	5.4
TOTAL Public Sector	199725.	10.5	2384.	10.3
TOTAL Private and Public Sectors	1895269.	100.0	23041.	100.0

Totals may not add due to rounding