

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

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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 Steve Pazand, Unit Supervisor, Actuarial Research, NMDOL, made certain we obtained the detailed, but unpublished data needed for our research.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 facilities 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.

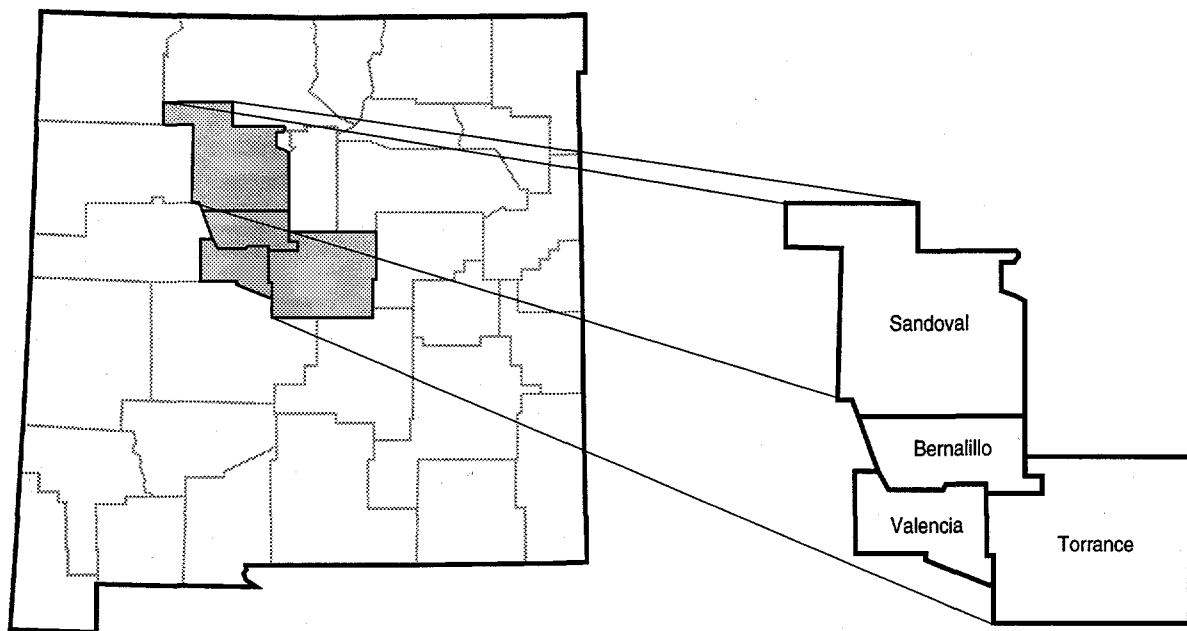


Figure 1. SNL Four-County Central New Mexico Region.

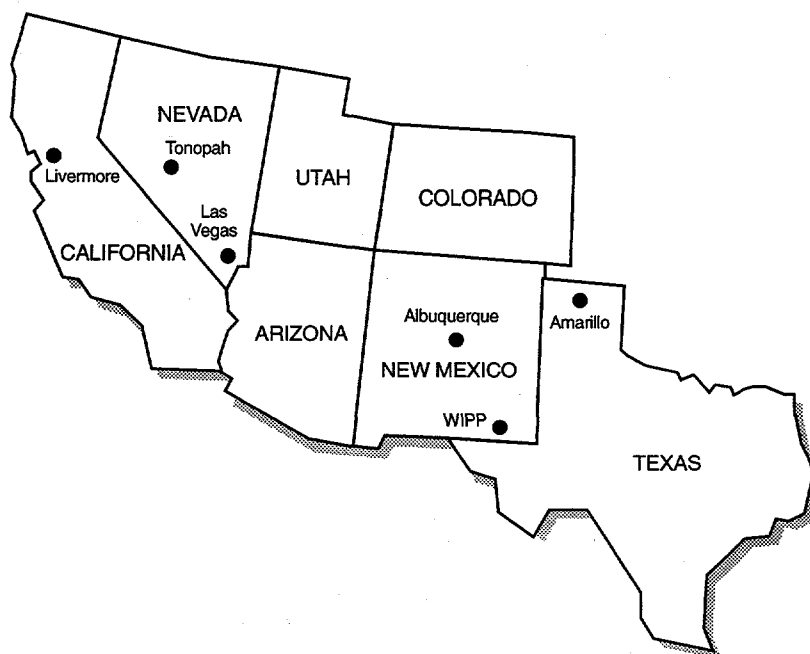


Figure 2. Location of SNL Facilities.

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 (B61-12) 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 respending 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.

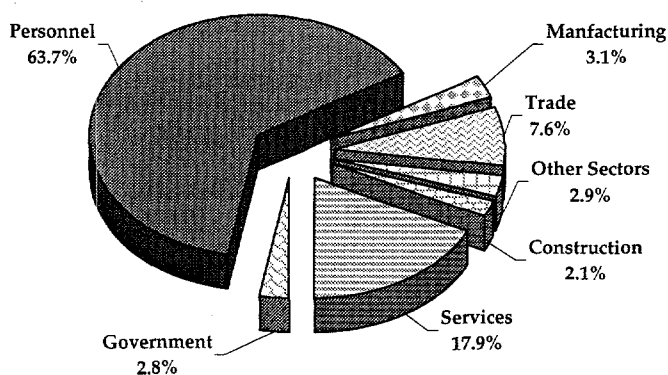


Figure 3. SNL Expenditures in Central New Mexico by Major Sector, FY 1998.

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.

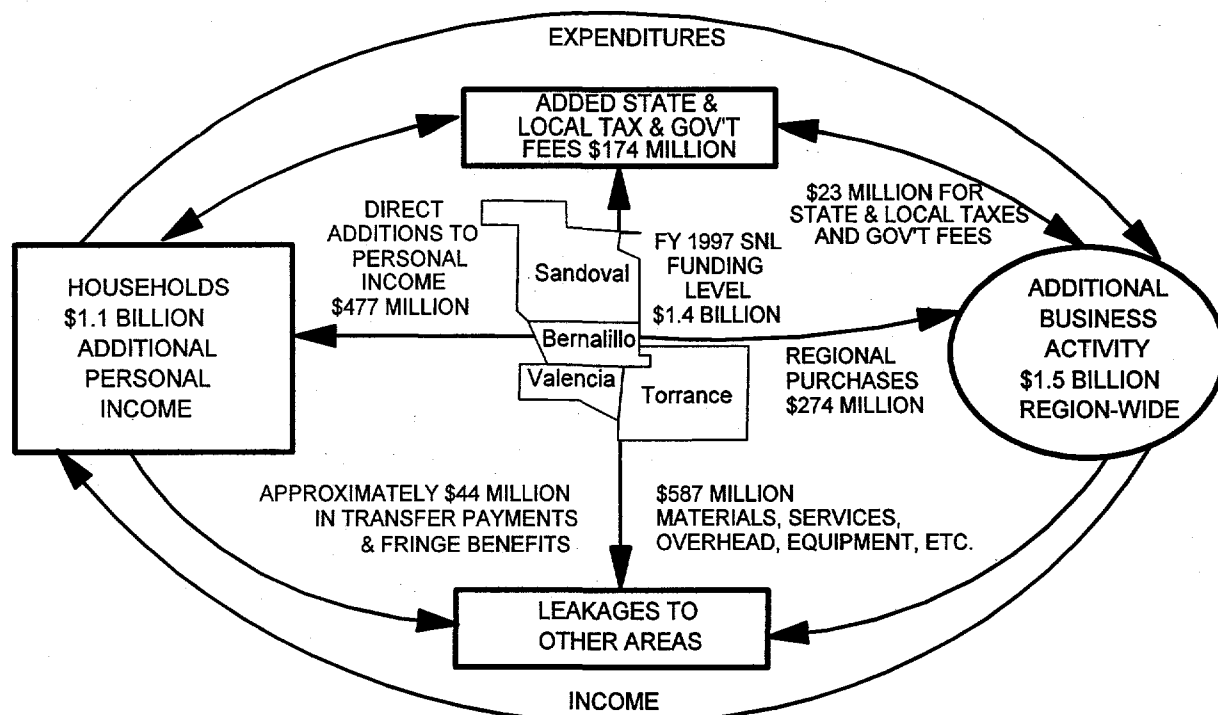
Several useful products of the I/O modeling technique are multipliers. Three multipliers: The first related to general economic activity, the second to income, and the third to employment, provide information needed to estimate SNL's impact. The activity multiplier identifies the extent to which an activity, 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



Total Regional Economic Impact -- \$4.2 Billion

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 \pm 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) | <u>2.79</u> | | |
| Total Economic Activity | 4.19 | 47 | 8.9 |
| Economic Activity Multiplier | 2.98 | | |
| Personal Income | | | |
| Gross Labor Costs | 0.52 | | |
| Net Wages and Salaries | 0.48 | | |
| Indirect and Induced (a) | <u>0.66</u> | | |
| Total Personal Income | 1.14 | 15.7(a) | 7.2 |
| Personal Income Multiplier | 2.38 | | |
| - - number of employees - - | | | |
| Employment | | | |
| Direct | 7,207 | | |
| Indirect and Induced (a) | <u>20,386</u> | | |
| 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 respending 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. Textiles 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).

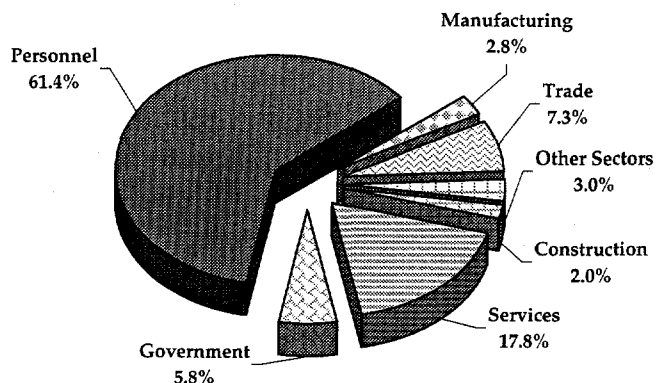


Figure 5. SNL Expenditures in New Mexico by Major Sector, FY 1998.

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 respending 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.

Respending 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, respending 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

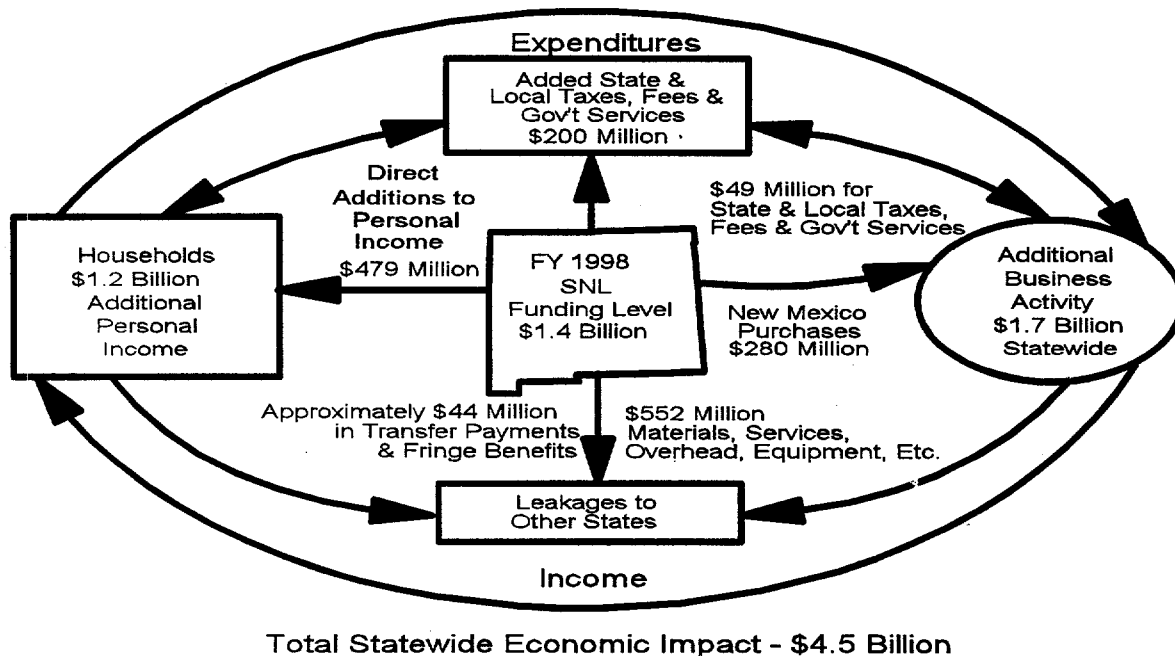


Figure 6. SNL Economic Impact on the State of New Mexico, FY 1998.

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 respend 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) | <u>3.11</u> | | |
| 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) | <u>0.74</u> | | |
| 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) | <u>23,041</u> | | |
| 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 |
| Total Operating and Capital Budget | 1.000000 |

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 |
| Total Operating and Capital Budget | 1.000000 |

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