AN OVERVIEW

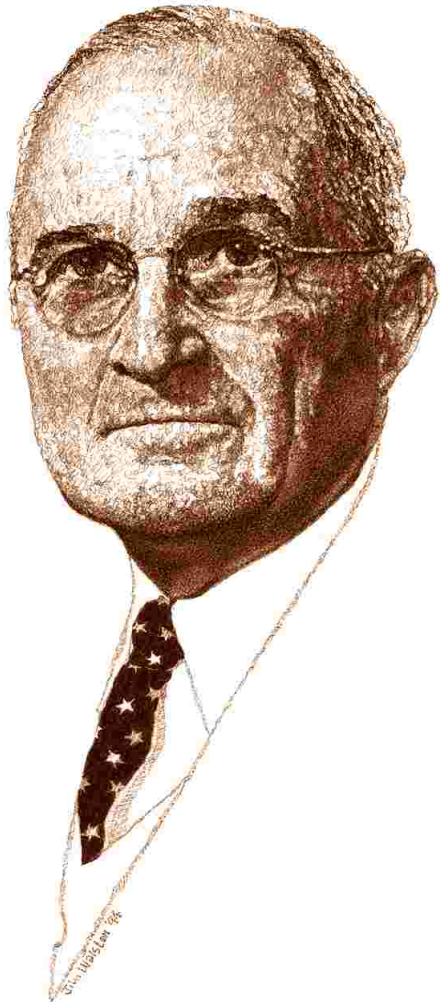
SANDIA NATIONAL LABORATORIES

Sandia National Laboratories

A Department of Energy National Laboratory

SANDIA

National Laboratories



President Harry Truman established Sandia in 1949.

Our MISSION

Sandia National Laboratories got its start in 1945 in Albuquerque, New Mexico, as part of the Manhattan Project, which produced the first nuclear weapons. In 1949, President Harry Truman wrote American Telephone & Telegraph Corporation, offering the company "an opportunity to render an exceptional service in the national interest" by managing Sandia. AT&T managed Sandia for 44 years. Today, Sandia is managed by the Lockheed Martin Corporation for the Department of Energy.

The Laboratories' enduring mission is to provide science and engineering support for the nuclear weapons stockpile. Today, this mission includes other aspects of national security, such as preventing the spread of nuclear, chemical, and biological weapons; developing technologies and strategies for responding to emerging threats such as terrorism; and preventing disruption of critical infrastructures such as energy supply and financial networks. Sandia collaborates with industry, universities, and other government agencies to commercialize new technologies.

Energy Secretary Bill Richardson greets Sandia employees during a tour of the neutron generator production facility.

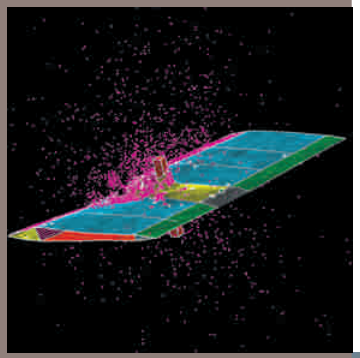
Sandia extended the life of the nuclear arsenal by modifying an existing weapon with modern safety features, shown here in a flight test drop from the B2 bomber.

NATIONAL

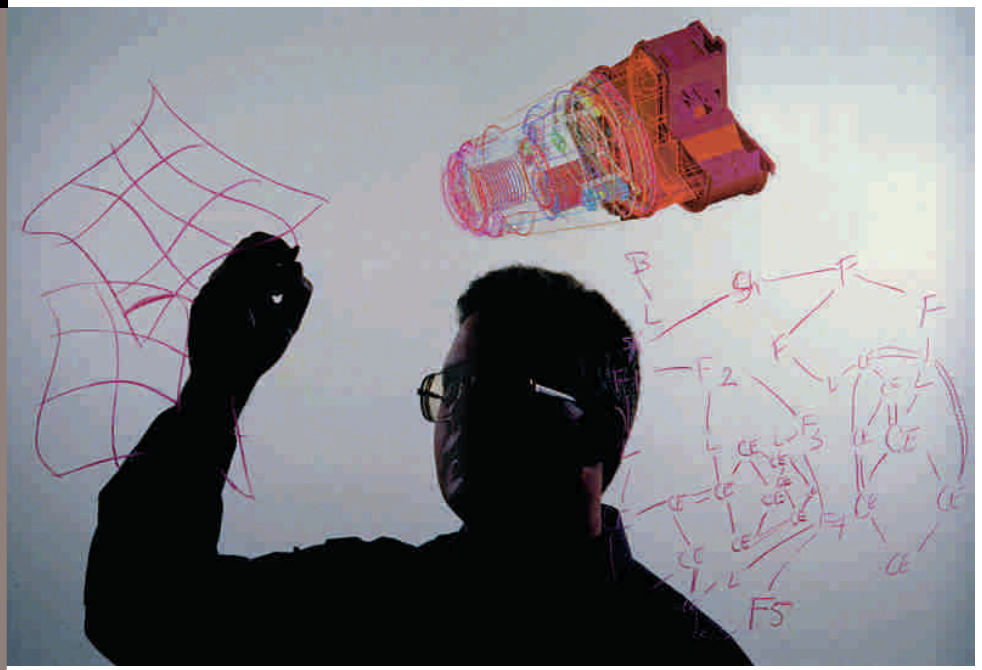
Security

Sandia is responsible for the research, design, and development of 90 percent of the approximately 6,000 components of a modern nuclear weapon. These components include security systems, arming and fuzing mechanisms, safety systems, instrumentation, parachute systems, and aerodynamic design. We also conduct survivability tests, develop robotic systems to dismantle retired weapons and help clean nuclear waste sites, and test containers to ensure they will protect nuclear materials during transport.

Sandia uses sophisticated 3-D computer simulations and conducts nuclear fusion research in order to understand and model the behavior of nuclear weapons. This science-based stewardship of the nuclear weapons stockpile is vital to ensuring the continued safety, security, and reliability of the stockpile in the absence of actual testing.



A computer simulation depicts damage to an airplane wing involved in an accident.



Engineer Arlo Ames develops sophisticated mathematical algorithms to analyze data from three-dimensional computer models.

The Sandia/Intel teraflops computer can complete up to 1.8 trillion mathematical operations per second.

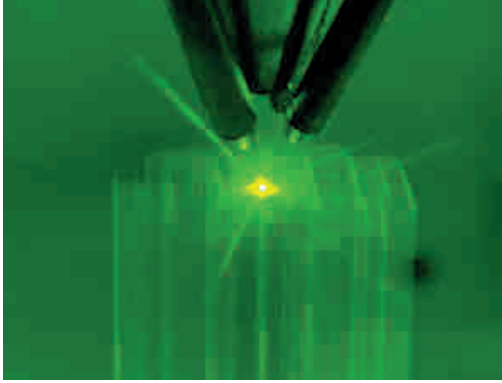
This responsibility has caused Sandia to develop into a premier research and development laboratory with unparalleled expertise in systems engineering. From the early days of developing safe, reliable electrical connections to the modern challenge of designing ever tinier and lighter electronic command and control systems, Sandia's work has been at the cutting edge of technological development.

Our nuclear weapons experience plays a role in preserving world peace and public safety. The Cooperative Monitoring Center in Albuquerque shows international visitors how modern technology can be used to verify treaties with neighboring countries, thereby helping to establish a foundation for trust and cooperation. Sandia experts help the United Nations and the International Atomic Energy Agency investigate clandestine weapons programs. Our scientists and engineers also work closely with the Former Soviet Union to protect nuclear materials and to provide material accountability. Sandia sensors in satellites and ground systems detect seismic activity and the presence of radioactive materials associated with nuclear testing anywhere in the world.

High-performance computing makes it possible to simulate catastrophic events such as this airplane fire.

Sandia's work has been at the cutting edge of technological development.

RESEARCH
& Development

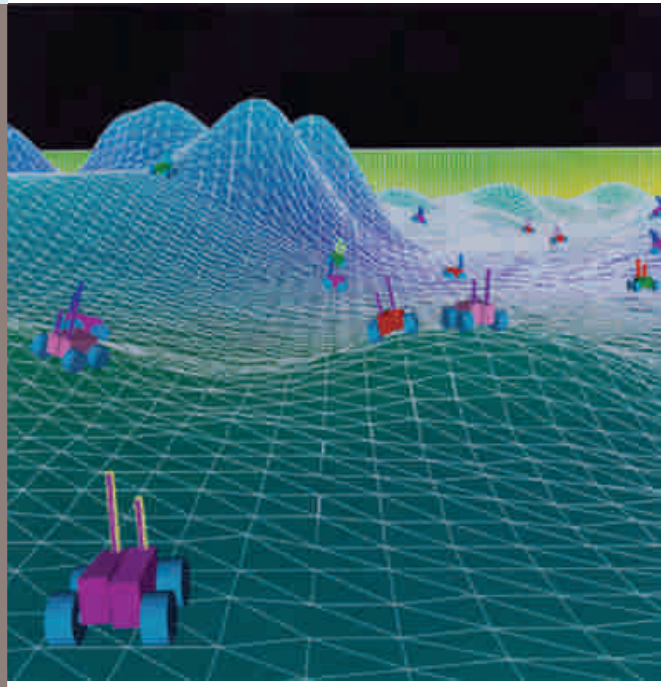


Sandia has become expert at developing practical solutions to complex problems.

Predicting the performance of nuclear weapons systems throughout their life cycles requires accurate simulation, detailed analysis, and reliable engineering. Protecting such weapons from unauthorized use requires data encryption, access codes, and the secure transfer of sensitive information. During five decades of work in these areas, Sandia has developed exceptional capabilities in supercomputing and information sharing.

Micromachines the size of a dust mite are being developed for security, guidance and control, sensors, and optical switches for faster computers.

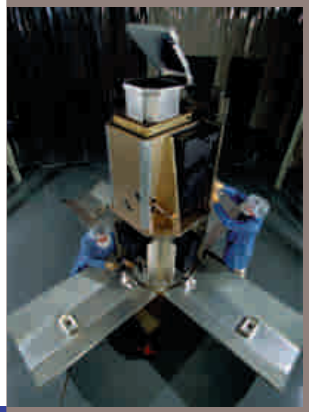
Sandia has acquired expertise in the design and manufacture of microelectronic devices and semiconductors as a result of developing smaller, lighter, and more reliable command and control systems that improve the security, efficiency, and aerodynamic design of weapons systems. Innovative micromachines integrate chemical and physical sensors, optical devices and other working parts on a single silicon device no bigger than a grain of sand. Sandia is developing a chemlab on a chip that will have the intelligence to "know" where it is at any time. Such devices could provide a swarm of "robugs," tiny mobile robots, with the ability to analyze a wide range of gases and liquids on a battlefield, and then to communicate that information to a central station.



A computer simulates a swarm of "robugs" traversing hilly terrain.

Other innovations include high-speed satellite mapping, remote battlefield monitoring, and intelligent robotic systems that use smaller, more powerful sensors and computer algorithms that prioritize and analyze huge volumes of data. These capabilities are being used in weapons dismantlement, environmental cleanup, detection of buried land mines, and microsurgery.

Laser Engineered Net Shaping (LENS), a new manufacturing technology.



The need to make weapons systems impervious to radiation, called radiation hardening, has made Sandia the laboratory of choice for protecting sensitive electronic devices in satellites and planetary probes that encounter potentially damaging natural radiation in space.

Sandia's unique testing facilities and computer simulation capabilities allow developers to evaluate product design before a prototype is even made. Advanced manufacturing capabilities permit rapid fabrication of new products or components directly from three-dimensional computer models. Multiple designers also can simultaneously review and modify computer designs remotely.

The Multispectral Thermal Imager satellite will demonstrate new technologies for detecting facilities that could be manufacturing weapons of mass destruction.

Sandia also has been at the forefront of developing renewable energy technologies in the areas of photovoltaics, solar thermal, wind, and geothermal. Sandians have worked with other government agencies to help bring renewable energy to rural areas of Mexico and the Navajo Nation. Sandia played a key role in providing the technical expertise required for the development of Solar Two, the world's largest molten salt-based solar power tower near Barstow, Calif. The prototype solar power plant is capable of producing 10 megawatts of electricity, enough to supply 10,000 homes.

Solar Two near Barstow, California.

TECHNOLOGY

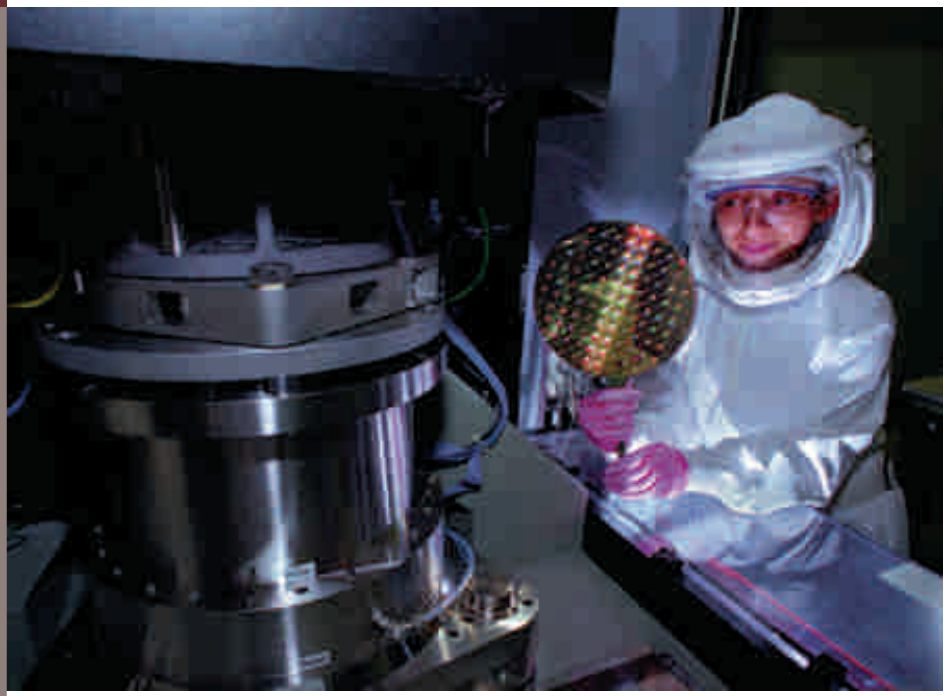
Spinoffs

Sandia's PAN Disrupter is the most widely used bomb-disablement technology among the nation's bomb squads.

Many technologies developed at Sandia benefit Americans.

The laminar-flow cleanroom, now used throughout the world for the manufacture of mircoelectronics, pharmaceuticals, food products, and for hospital surgery, was invented at Sandia in 1960. The technology uses a uniform flow of filtered air from the ceiling to the floor grates, or wall to wall, to remove dust, bacteria and fungi from the air. The laminar-flow clean room sparked a multibillion dollar industry and has been credited with making the modern microelectronics age possible.

Improved automobile safety airbags are a direct result of Sandia's work to perfect new fabrics for weapons parachutes and technologies to release them quickly. Sandia-designed airbags enabled the safe landing of NASA's Pathfinder spacecraft on Mars.



Modern cleanrooms are used for the production of microprocessors, the "brains" of computers.

Other Spinoffs Include:

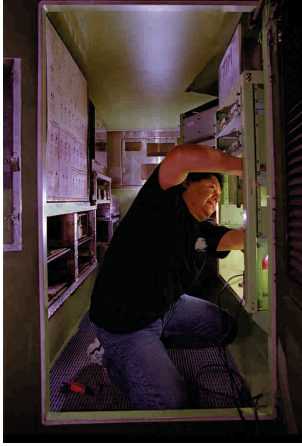
- A walk-through explosive detection portal developed for the Federal Aviation Administration to screen passengers for explosives.
- Bomb disablement technologies that allow bomb technicians to "render safe" both crude and sophisticated terrorist-type explosive devices without having to approach the bombs.
- A device that analyzes blood samples in minutes for indications of disease.
- Computer software for use in breast cancer detection.
- A glucose sensor designed to improve the quality of life for diabetics.
- A computer chip that retains its memory, even when the power goes out or the screen freezes.
- A better, more efficient way to uncover defects in integrated circuits.
- A specially adapted spark plug that uses Sandia's special laser techniques to "see" inside automobile engines to diagnose for misfiring and idling problems.
- A semiconductor bridge that is capable of igniting explosives a thousand times faster than conventional hotwire detonators.
- An evidence detector, a forensics tool that easily detects crime-scene evidence such as blood, fingerprints, and semen.
- A software program called Vraptor that allows law-enforcement trainees to identify and practice shooting at the criminal, not the victim, during the confusion, impaired visibility, and rapid chances of a crime that is unfolding.
- More durable drill bits used in most off-shore and deep-drilling operations that use an improved Sandia method of bonding manmade polycrystalline diamond cutting elements to the bits.

Sandia is developing technology to find and remove buried land mines.

The crime-scene evidence detector is helping law-enforcement agencies solve crimes.

BUSINESS

Partnerships



Laguna Industries, an Indian-owned defense contractor in New Mexico, has collaborated with Sandia to test the performance of portable command centers.

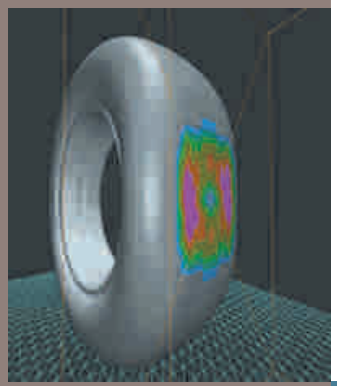
Sandia works closely with industry, universities, and other government agencies to bring new technologies to the marketplace. Many of Sandia's technology spinoffs result from such partnerships. Sandia has been transferring technology to industry for more than three decades, especially where such agreements benefit the Labs' primary mission for the DOE.

Sandia may negotiate directly with industry to sign cooperative research and development agreements (CRADAs) – formal technology commercialization agreements that permit the labs to collaborate with industry on mutually beneficial research. Other options include licensing agreements, technical assistance, use of unique Sandia facilities, technical personnel exchanges, and memoranda of understanding for pursuing shared interests.

Technology Ventures Corp., established by Lockheed Martin Corp. in 1993, works with Sandia to identify technologies with commercial potential, and coordinates the development of business capabilities and seeks sources of risk capital. TVC has helped capitalize and launch more than 30 businesses.

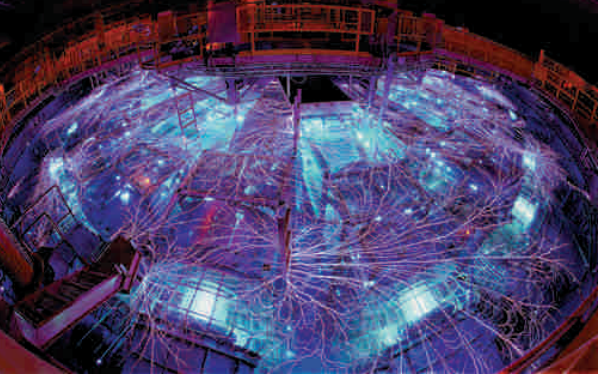
Business and industry now have the opportunity to tap into Sandia and other technical entities stretching along the New Mexico Technology Corridor. The corridor stretches from Los Alamos National Laboratory northwest of Santa Fe to New Mexico State University just north of the Mexican border. Renowned institutions located in the corridor include Sandia and Los Alamos national laboratories, the U.S. Air Force Research Laboratory Phillips Research Site, the University of New Mexico, the Santa Fe Institute, White Sands Missile Range, New Mexico Institute of Mining and Technology, the Lovelace Respiratory Research Institute, and New Mexico State University. The 200-acre campus-like setting just outside Kirtland Air Force Base provides easy access to technology built on the knowledge gained from more than a half-century of science and engineering serving the nation's highest interests.

Sandia computer simulations have permitted Goodyear to design more durable tires.



General Motors is using thermal spray technology developed at Sandia to make lightweight aluminum engine durable.

User FACILITIES



The Z machine at Sandia is the world's most powerful X-ray source and has achieved a peak output that is 100 times that of all the Earth's electric power plants.

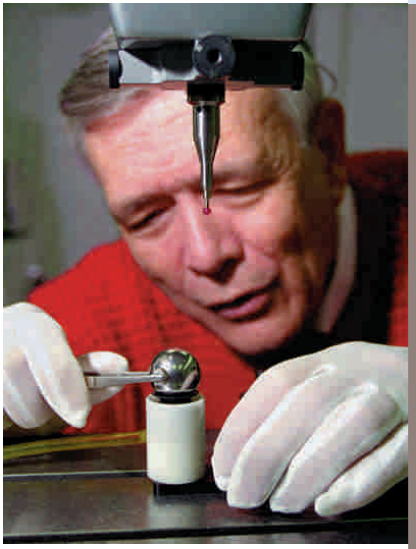
Sandia has many unique facilities that accommodate research and development. Many of these facilities are available for use by U.S. industry, universities, other laboratories, state and local government agencies, and the scientific community.

User-facility agreements, which can be executed in as little as 30 days, require a statement of work prepared by technical representatives from Sandia and the sponsor. Each project has to demonstrate its benefit to the DOE. A company representative performs the work at the facility, and Sandia provides support staff for maintenance and safety procedures.

The agreements allow use of the physical facilities, equipment, instrumentation, scientific expertise and necessary operational personnel. Among the facilities available are:

- Combustion Research Facility
- Component Modeling and Characterization Facility
- Electronic Technologies Facility
- Electronics Quality and Reliability Center
- Engineering Sciences Experimental Facilities
- Explosive Components Facility
- Geomechanics Laboratory
- Intelligent Systems and Robotics Center
- Manufacturing Technologies Center
- Materials and Process Diagnostics Facility
- Mechanical Test and Evaluation Facility
- National Solar Thermal Test Facility
- Plasma Materials Test Facility
- Primary Standards Laboratory
- Pulsed Power and Systems Validation Facility
- Radiant Heat Facility
- Shock Technology and Applied Research Facility
- Virtual Laboratory Testbed

Intelligent machines developed at Sandia handle dangerous tasks such as weapons dismantlement and environmental cleanup.



The Primary Standards Laboratory develops and maintains primary standards traceable to national standards and calibrates and certifies customer reference standards.

COMMUNITY

Involvement

Sandia's employees have long maintained a tradition of community service. Community involvement is an important part of being a good corporate citizen.

In 1999, our employees donated $1.7 million to the United Way campaign of Central New Mexico – one-fifth of all contributions. This included $50,000 from Lockheed Martin Corporation for the Rocket Reader Program, a volunteer program with Albuquerque Public Schools aimed at making sure that elementary school students read at their grade level by the time they finish third grade. In California, Sandians donated a record $216,000 to the Livermore Employee Assistance Plan. Sandia recently received the Outstanding Business in Philanthropy Award from the New Mexico Chapter of the National Society of Fund Raising Executives.

Mentors from Sandia serve as role models for youth. They teach kids about health care, help them develop marketable job skills, and encourage them to serve as role models for other kids. Sandia has pledged 100 mentors to the President's Summit, a program to provide 2 million mentors by the year 2000. Last year, our employees donated 80,000 hours of volunteer time to community projects.

Each year, Sandia employees provide new shoes to hundreds of youngsters selected by their schools.

Sandia employees help build a new home for an Albuquerque family through Habitat for Humanity.

Once a year, our employees provide warm, durable shoes to schoolchildren chosen by their principals. In 1998, these donations provided shoes for 475 students.

To encourage academic excellence, Lockheed Martin Corporation sponsors the annual Thunderbird Scholarships for high school students who overcome adversity to succeed. Sandia employees serve as mentors and judges at science fairs. Museum exhibits, such as the RATLER (Robotic All-Terrain Lunar Exploration Rover) featured at the National Atomic Museum and the Space Hall of Fame in Alamogordo, N.M., demonstrate the challenge and excitement of careers in math and science.

Our PEOPLE

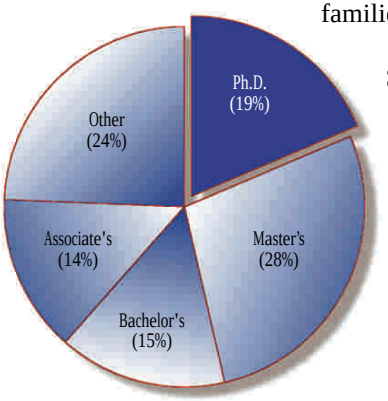
Sandia has about 7,600 permanent employees, located primarily in Albuquerque, N.M., and Livermore, Calif. Sandians also work at the Pantex Plant in Texas, the Waste Isolation Pilot Plant in New Mexico, the Kauai Test Facility in Hawaii, and the Tonopah Test Range in Nevada. The labs' work force consists of highly educated and highly skilled engineers, scientists, technologists, and administrative support staff. Among the labs' engineers and scientists, about 1,330 hold doctoral degrees and 1,550 hold master's degrees. New Mexico, where about 6,500 Sandians work, is home to the highest percentage of Ph.D. scientists and engineers of any state in the country.

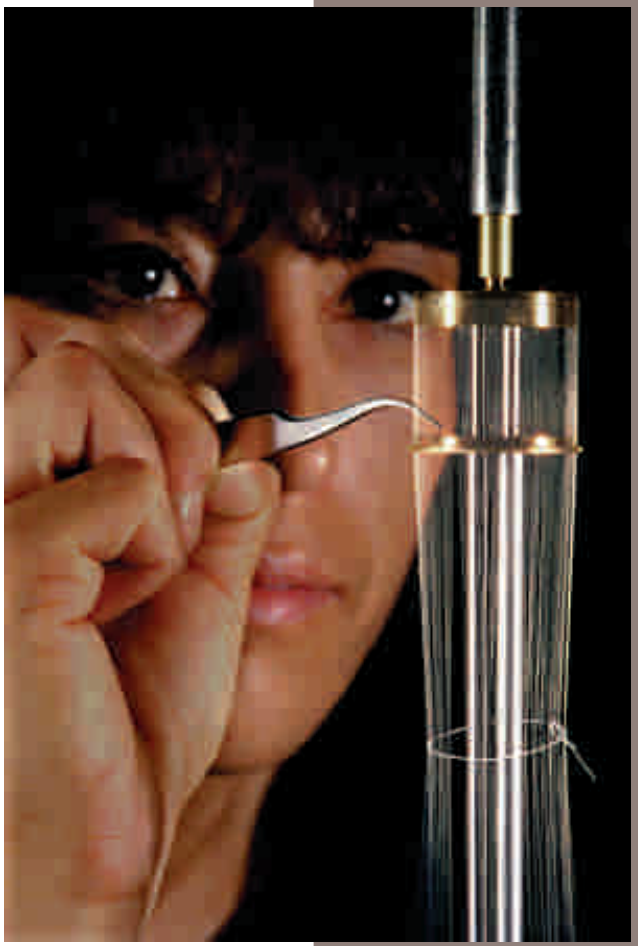
Sandians each year are recognized for a variety of breakthrough technologies that often have commercial applications beyond the weapons program. Over the past two years alone, Sandia received 11 R&D 100 awards, given annually by R&D Magazine for the most promising new technologies that provide solutions to complex or long-standing problems. Two of Sandia's technologies were recognized by Industry Week magazine as being among the top 25 significant technologies of 1998. Among other recent awards are two Discover Awards, issued each year by Discover magazine in recognition of the year's top inventions and engineering achievements. In addition, many Sandians each year are recognized by their peers throughout the nation with awards provided by professional organizations.

Sandia is committed to being an employer of choice, emphasizing quality of life as well as quality work. During our recruitment program at many of the nation's universities, we persuade 100 to 300 new families each year to move to our sites.

Sandia is an equal opportunity employer.

Regular Work Force by Degree Level



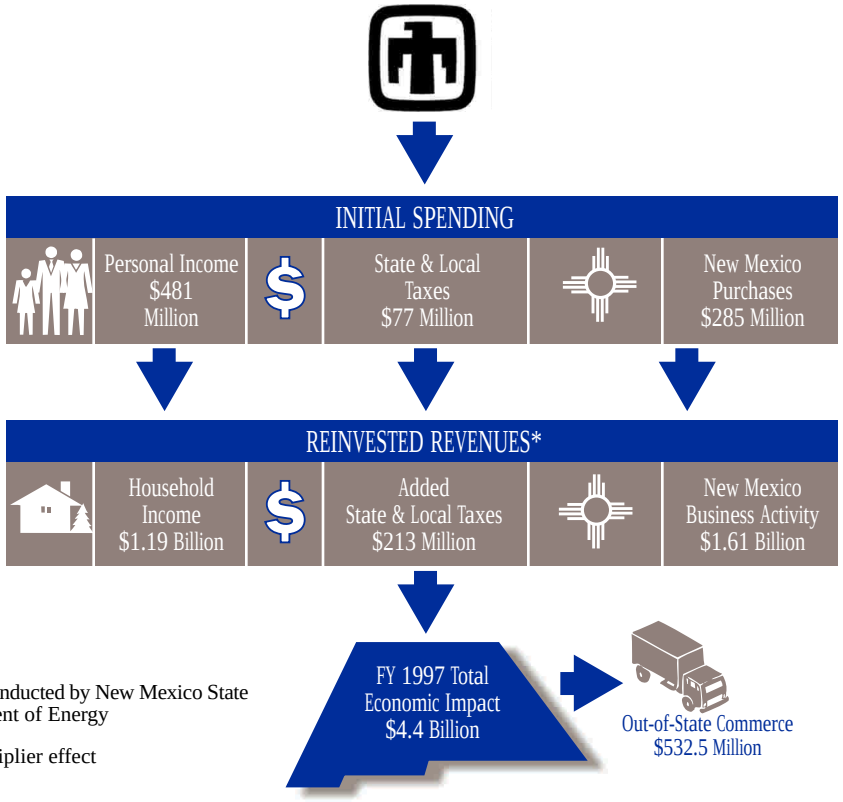


Technician Dolores Graham uses tweezers to build an array of wires that form a target for Sandia's Z machine.

ECONOMIC *Impact*

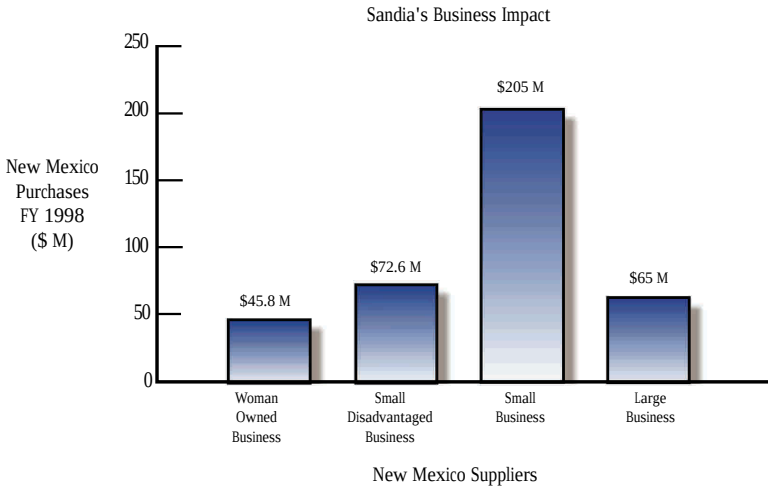
In 1998, the DOE selected Sandia as its Management & Operating Contractor of the Year

Sandia accounts for $4.4 billion or almost 4.8 percent of the economic activity of New Mexico. The Labs creates or supports nearly 30,000 jobs, which is about 3.5 percent of the total employment in the state.



Based on FY97 economic study conducted by New Mexico State University and the U.S. Department of Energy

* Additional impact through multiplier effect



Special supplier opportunities are available to small minority-owned or women-owned businesses, with support from the Department of Energy. In 1998, the DOE selected Sandia as its Management & Operating Contractor of the Year, recognizing Sandia's support for small business. This was the second time in five years Sandia had been so recognized. Sandia's supplier relations program matches laboratory needs for products and services with businesses that can provide high-quality products and services timely and cost effectively.

For more information about Sandia, please call the
Public Relations and Communications Center at (505) 844-4902
or visit our Web site at http://www.sandia.gov for Sandia New Mexico, and
http://www.ca.sandia.gov for Sandia California

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin company,
for the United States Department of Energy under contract DE-AC04-94AL85000.
SAND 99-0764 Stk. No. 698189

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