THIS IS

SANDIA

National security
Energy
Environment
Electronics
Manufacturing
Information technologies
Pulsed power
Technology transfer
Education outreach
Community involvement
Financial overview

Sandia National Laboratories
a U.S. Department of Energy multiprogram R&D laboratory

MARTIN MARIETTA

Sandia is a multiprogram engineering and science laboratory operated for the Department of Energy with major facilities at Albuquerque, New Mexico, and Livermore, California, and a test range near Tonopah, Nevada. We have major research and development responsibilities for nuclear weapons, arms control, energy, the environment, economic competitiveness, and other areas of importance to the needs of the nation. Our principal mission is to support national defense policies by ensuring that the nuclear weapon stockpile meets the highest standards of safety, reliability, security, use control, and military performance.

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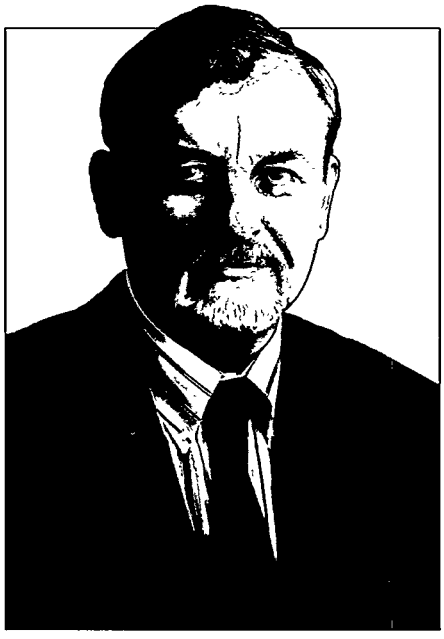
This is

Sandia

MASTER

President's message



I cannot remember a period in Sandia's history that has been marked by a greater rate of significant accomplishments than I am witnessing today. At the same time, I cannot recall a period as uncertain and threatening to the vitality of the Laboratories as today. It is a time of great challenge.

When I returned from AT&T Bell Labs six years ago, I saw the need for a more customer-focused enterprise. We needed more partnerships with industry and more emphasis on community outreach.

As a result, we set into motion many changes, both cultural and programmatic, that have led to many accomplishments. During this time, we have streamlined our operations, won more technical awards, and received high marks from our customers. Our transition to management by Martin Marietta Corporation has been smooth. We have continued to establish more than 200 cooperative research and development agreements with industry, valued at more than $600 million. We have provided technical assistance to more than 300 small businesses. We have acquired and refined the world's highest-performance supercomputer and developed world-class facilities such as the Microelectronics Development Lab, Materials Research Lab, Robotics Lab, and Technology Information and Outreach Center.

But we must not take our current level of prosperity for granted. Already in 1989, I could see that the Department of Energy and its labs faced a rocky road. This concern continues today. Sometimes the importance of our missions in weapons, energy, and environmental cleanup is called into question by Congress and others. Our strategy will continue to be to execute our core missions through mutually beneficial university and industry partnerships. We will continue to support stockpile stewardship, dismantlement, and non-proliferation.

If Sandia prospers, New Mexico and California also benefit. But it is important to remember that Sandia is a national laboratory, supported by taxes from outside New Mexico and California. Our institutional survival depends on serving national needs. If we succeed, the community also benefits.

I believe we have a good shot at success! The future is not a sure thing. But I am optimistic about it.

Al Narath

A word about change

At Sandia National Laboratories, we have encountered a great deal of change since President Harry Truman challenged us in 1949 to provide "exceptional service in the national interest" through stewardship and development of the nation's nuclear weapon stockpile. In the early 1970s, in response to the Arab oil embargo, we were given another mission: development of new technologies to provide for America's energy needs. In 1989, Congress added yet another challenge, the transfer of technologies originally developed for military purposes to the private sector.

Today, we continue to look for opportunities to share promising technologies in environmental restoration, advanced manufacturing, microelectronics, transportation, health care, and information science and computing. We try to be good neighbors as well as good corporate citizens — Sandia's employees continue to be involved in the community through education outreach, volunteer work, and charitable donations.

Economic incentives are among the strongest catalysts for change. In this era of shrinking budgets, we must get the most mileage from each taxpayer dollar. Under the leadership of Martin Marietta Corporation, the company that manages Sandia for the Department of Energy, we strive to be more efficient yet still fulfill the mission given to us by the United States president, the Congress, and the American people.

It is for you, the American public, that we have produced this magazine. Whether you are a businessperson, a student, a teacher, a homemaker, or a casual reader, we hope this booklet helps you understand who we are and what we do. Our work is a natural part of the cutting-edge technology needed by the United States to maintain economic and military leadership. Technology, we trust, that will also be of interest to you.

The Editorial Staff

New partnerships, New technologies

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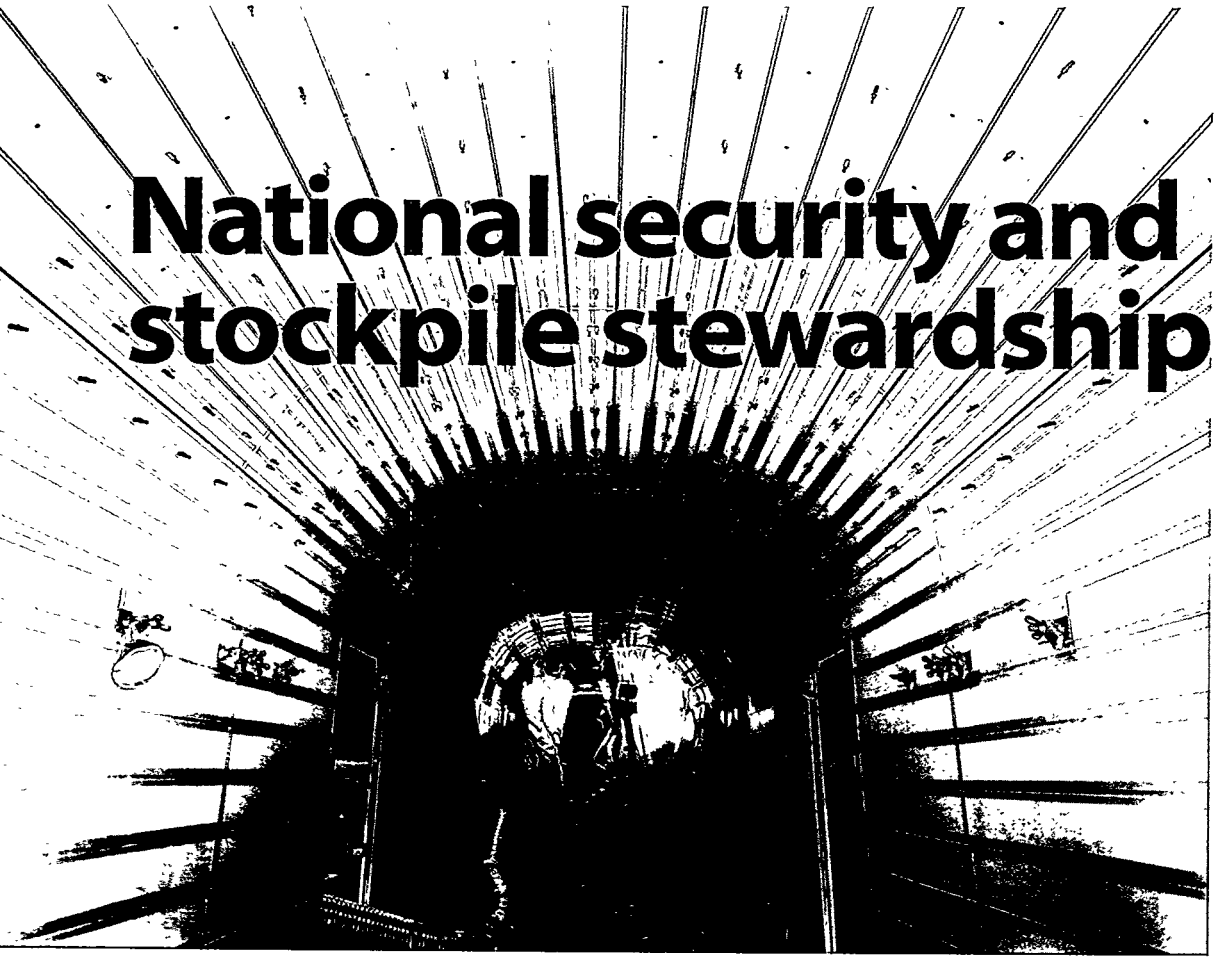
National security and stockpile stewardship



Russian rail cars that carry materials from dismantled nuclear weapons have been refurbished with protective barriers and other security devices provided by Sandia.

During the war in the Persian Gulf, Americans saw daily news footage of modern military capabilities. Smart weapons homed in on targets from afar, vision systems watched enemies at night, and missiles intercepted and destroyed other missiles.

None of these accomplishments was accidental. They were the result of ongoing research by Department of Energy laboratories like Sandia and private defense contractors like Martin Marietta, whose primary business is keeping America's weapon systems safe, modern, and effective. "For, you see, in this age of 'come-as-you-are wars,' the casualties we suffer in combat depend to a large degree on our preparedness prior to the initiation of combat — a point writ bold in contrasting the initial battles in, say, Korea and the Persian Gulf," said Norm Augustine, Martin Marietta's chief executive officer, in a speech to the Economic Club of Washington.

Sandia's primary mission has always been stewardship and development of the nation's nuclear weapon stockpile. It is a responsibility that goes beyond weapon development to include all aspects of national security — arms control and nonproliferation, monitoring of nuclear detonations and covert efforts to develop weapons of mass destruction, efforts to bring hostile parties together to encourage negotiation and preserve peace, special facilities to test weapon performance, and security and surveillance systems to protect national defense information or weapon materials from falling into the wrong hands.

Following are just a few examples of the many contributions to national security Sandia has made over the past 45 years:

• Sandia's development of permissive action links for nuclear weapon control has led to world leadership in the field of cryptography, particularly as it applies to message authentication. This same capability is now helping banks protect the security of financial transactions.

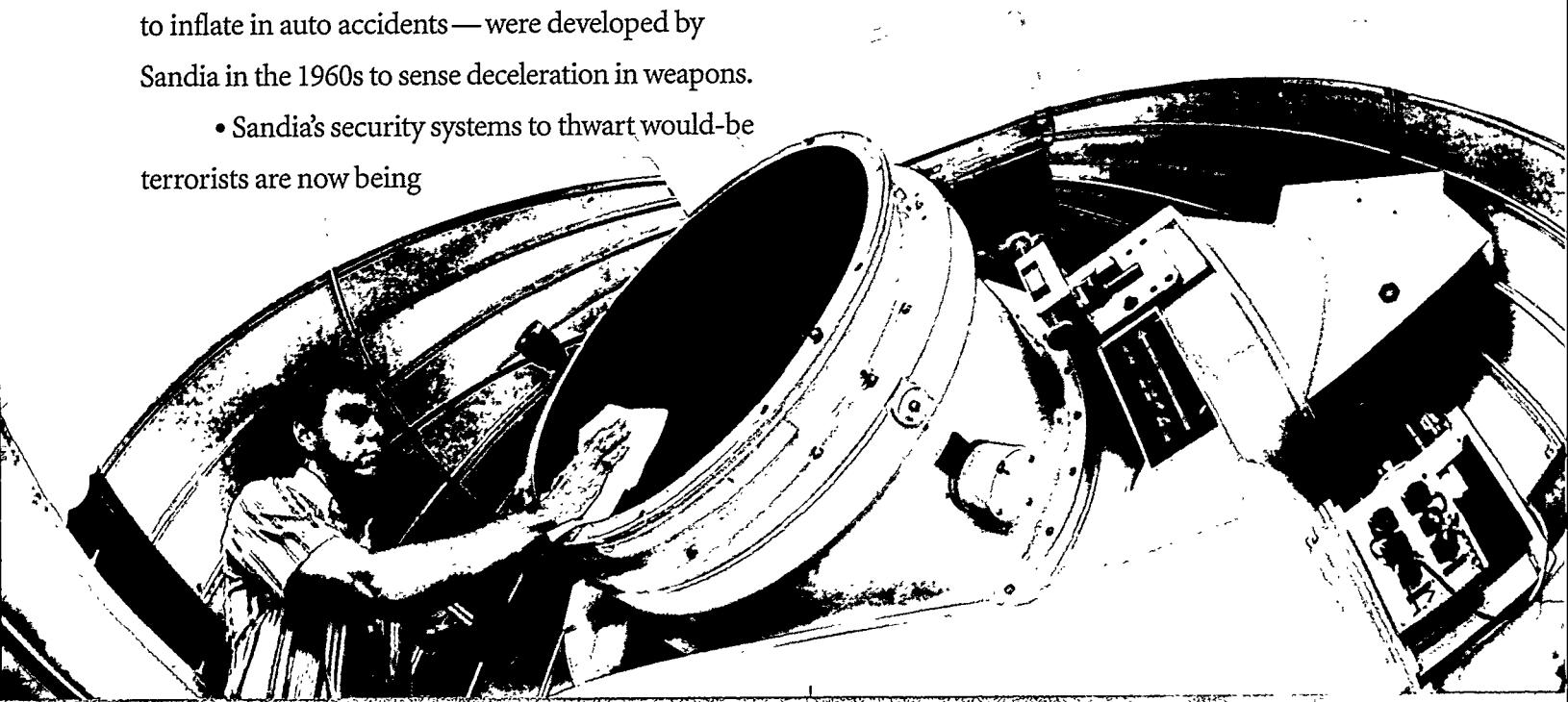
• Sandia-developed monitoring capabilities have long provided precise information about hostile developments around the world, from clandestine nuclear weapon programs in Iraq to underground nuclear detonations in China. These same capabilities have led to the establishment of a Cooperative Monitoring Center in New Mexico, where diplomats from the Middle East and elsewhere have learned about information technologies that can help sparring nations trust each other more and negotiate peace more effectively.

• Rolamites—tiny actuators that cause air bags to inflate in auto accidents—were developed by Sandia in the 1960s to sense deceleration in weapons.

• Sandia's security systems to thwart would-be terrorists are now being used in Russian rail cars to safeguard materials from dismantled nuclear weapons. "Sticky foam," a nonlethal deterrent that literally glues an intruder in place, is being considered by U. S. law enforcement agencies as a potential tool in the nation's war against crime.

• Sandia's world-class science and engineering staff, always on hand to respond to the nation's defense needs, responded in 1990 by investigating and finding a plausible explanation for the tragic turret explosion on the USS *Iowa*.

Dave Denning polishes the lens of a Cassegrain beam telescope that can track satellites orbiting the Earth. Its main purpose is to calibrate optical sensors on satellites that are used to monitor nuclear test ban treaties.

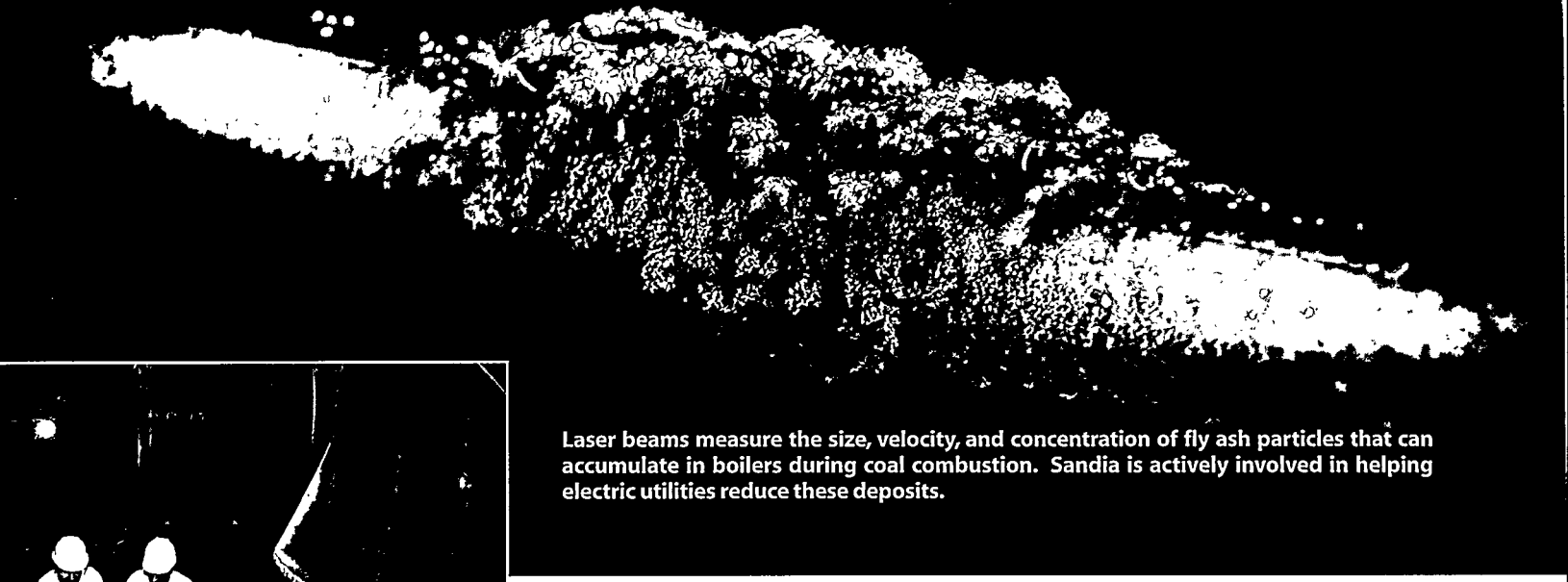


Energy

America's economic strength depends on having a secure, affordable energy supply. Sandia has contributed to energy research since the Arab oil embargo of the early 1970s. Today, this work, supported by the Energy Department, encompasses all forms of energy, whether it is used to power vehicles or provide electricity to the workplace and the home.

Sandia researchers have developed new technologies for power systems that use solar, coal, oil and gas, geothermal, and nuclear energy. They have also worked with universities and industry on energy conservation and energy storage technologies from better combustion systems to improved batteries. Their research has led to improved wind turbine designs, for example, and coal-burning power plants that have fewer ash-related maintenance problems. A special facility in California, called the Combustion Research Facility, supports work by universities and industry to understand and control combustion by,

Sharon Craft checks a rack containing solutions of nanoclusters, special materials with unique properties that may be useful for creating catalysts to make liquid fuel from coal.



Laser beams measure the size, velocity, and concentration of fly ash particles that can accumulate in boilers during coal combustion. Sandia is actively involved in helping electric utilities reduce these deposits.

Marty Pilch (left) and Michael Allen examine a downsized model of a containment vessel in a nuclear power plant. Such models are used to test nuclear safety.

for example, observing and measuring pollutant formation in flames. One of the innovations at this facility is an instrumented spark plug that can "see" the inside of an automobile engine during combustion.

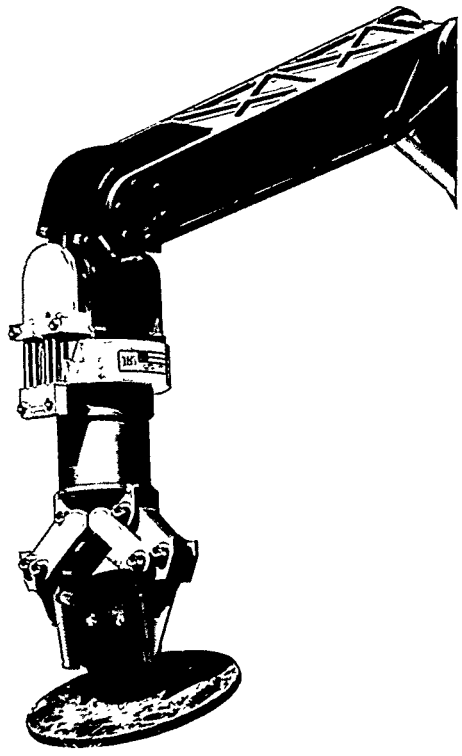
Oil and gas research is an important area of concentration at Sandia, and has led to such innovations as software to help maximize petroleum extraction from the earth, seismic sensors to locate underground reservoirs, and computer models to better understand and manage the nation's Strategic Petroleum Reserve, where oil is stored in underground caverns.

Sandia's solar energy research program is among the largest and most advanced in the world. Using state-of-the-art materials research capabilities, manufacturing technologies, and systems engineering skills, researchers have advanced both photovoltaic (direct conversion of sunlight to electricity) and solar thermal energy systems. The New Mexico site is home to a solar tower surrounded by an array of 220 heliostats that concentrate sunlight many thousands of times for use in energy or materials research. Sandia engineers have helped design and install solar power facilities throughout the U.S. and Latin America. A new solar power plant in California is using a Sandia-developed technology to store power for use at night and on cloudy days.

The nuclear energy program supports the need for improved safety systems for reactors and new technologies to extend the lifetime of existing reactors. Today Sandia is beginning to use its research reactors for production of molybdenum-99, a primary isotope used in medical radiography.

All energy research at the Labs is dedicated not only to increasing the nation's energy supply, but also to developing environmentally friendly ways of extracting fuel and producing power for mass consumption.

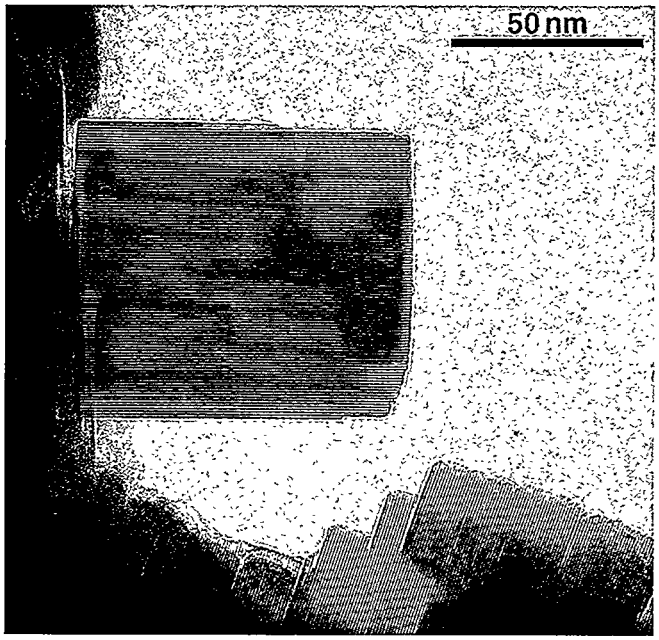
Environment



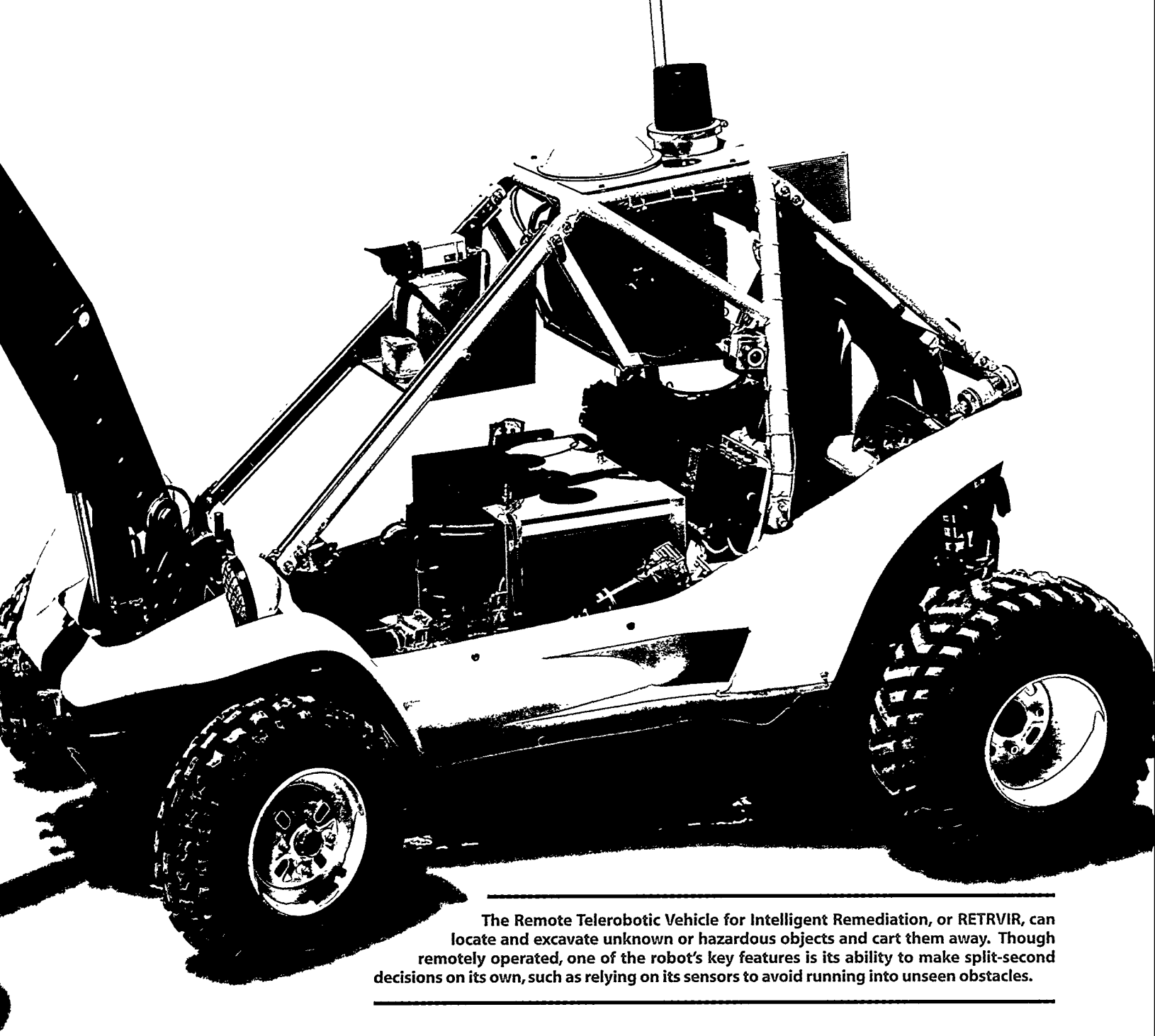
Environmental research at Sandia covers a broad spectrum of issues related to restoring and preserving the environment, such as preventing pollution by altering manufacturing processes, reducing the risk and toxicity of waste, safely transporting waste and hazardous materials, and remediating contaminated sites.

A special initiative called environmentally conscious manufacturing helps prevent pollution by designing new processes that eliminate or reduce hazardous substances in manufacturing. An example is solvent-free cleaning of printed circuit boards. Recycling programs minimize industrial waste through the collection and reuse of hazardous chemicals. An automated system developed at Sandia identifies and sorts recyclable plastics.

Sandia is also actively involved in improving the technologies available for waste characterization and site remediation. Microelectronic and fiber-optic sensors detect contaminants in soil, water, or air. Robotic systems help map and clean up hazardous waste. Aboveground sensor systems identify the contents of waste below the surface. Special materials remove radioactive



The crystalline structure of silico-titanates allows selective trapping and removal of highly radioactive cesium ions from mixtures of radioactive and hazardous waste; the cesium ions fit between the lattice planes.



The Remote Telerobotic Vehicle for Intelligent Remediation, or RETRVIR, can locate and excavate unknown or hazardous objects and cart them away. Though remotely operated, one of the robot's key features is its ability to make split-second decisions on its own, such as relying on its sensors to avoid running into unseen obstacles.

elements from mixtures of radioactive and hazardous waste. Scientific exchange programs enable scientists from the U.S. and the former Soviet Union to share technology and work together in addressing waste problems in both countries originating from the Cold War. Responding to the need for long-term storage of radioactive waste, Sandia scientists have helped design and test underground repositories such as the Waste Isolation Pilot Plant in New Mexico and the Yucca Mountain Project in Nevada.

Environmental research at Sandia is an essential part of the nation's efforts to preserve natural resources, protect public health, and maintain public confidence in federal research programs.

Electronics

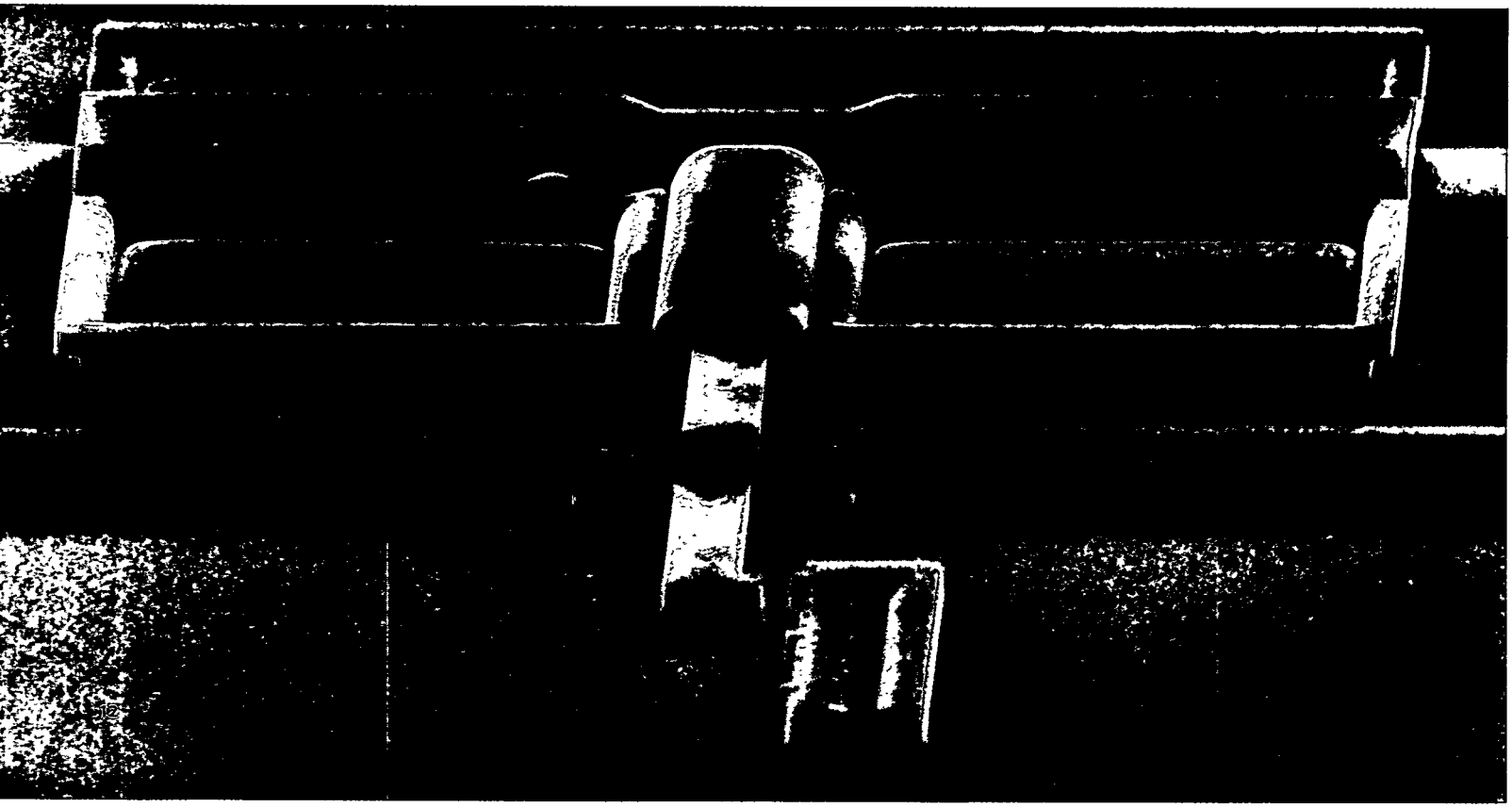
One of the most valuable technologies ever invented at Sandia is a clean room that continuously circulates and filters the air. This invention protects extremely tiny electronic circuits from damage by microscopic particles. Developed in the 1960s, today these laminar-flow clean rooms are found throughout the electronics industry.

Another well-known contribution by Sandia is radiation hardening. Originally developed to protect weapon systems from nuclear blasts, this capability has also protected civilian spacecraft, such as the Galileo probe to Jupiter, from damage caused by high-energy radiation in space.

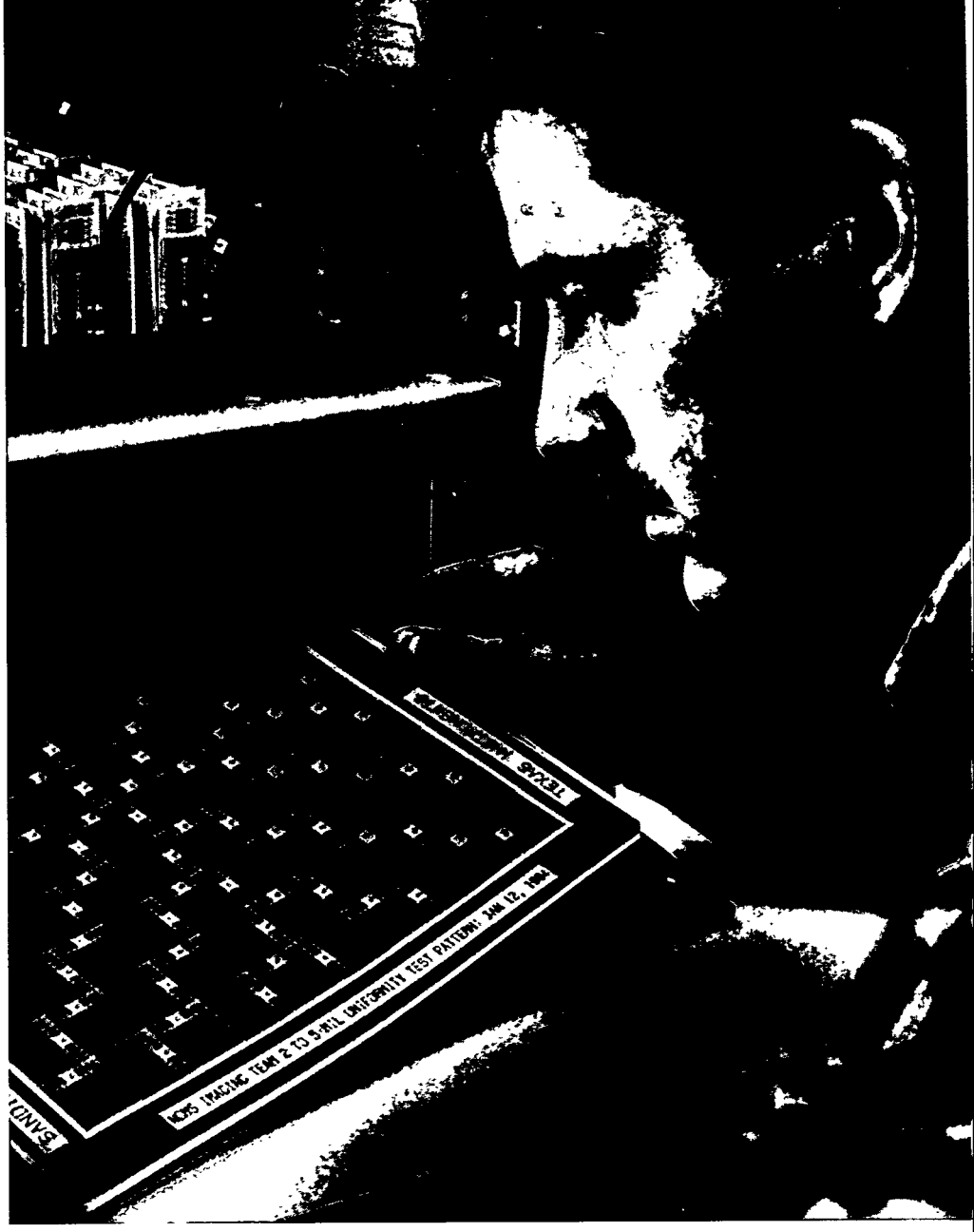
Because of its importance to command-and-control devices for weapon systems that weigh little and take up minimum space, electronics is considered one of Sandia's core capabilities. Sandia's expertise in electronics dates to the 1950s, when it began working with the domestic semiconductor industry after the invention of the transistor by Bell Laboratories.

Sandia continues to be actively involved in working with U.S. industry to share cutting-edge

The world's smallest steam engine, demonstrated at Sandia, uses heated vapor to manipulate a piston (center). The piston is 2 micrometers wide.



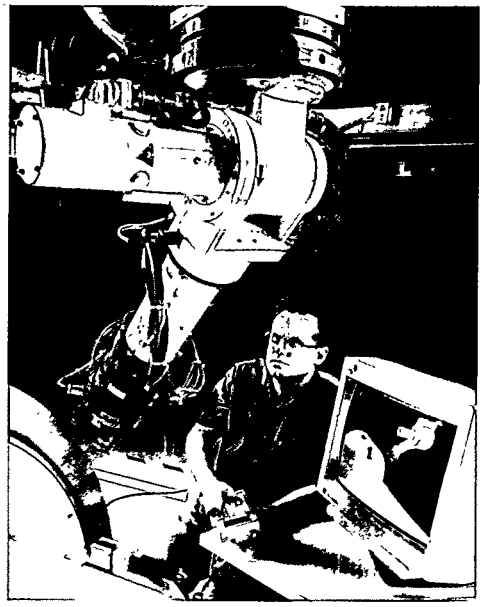
electronic technologies. Examples are advanced lithography, an imaging technique for producing submicron-size components; flat-panel displays, a new kind of high-definition video display; software and hardware for analyzing and testing microelectronic circuit performance; and chemical vapor deposition of copper and other special materials onto patterned silicon wafers. Cooperative projects, such as the SEMATECH consortium with private industry, allow researchers from the public and private sectors to share their expertise in such areas as manufacturing processes, materials growth, printed circuit board design, and testing.



Tim Estes examines a pattern template, one of the pieces of equipment he uses to provide printed wiring quality control and related services to the electronics industry. Estes and a former AT&T Bell Labs researcher have formed a new business based on such equipment.

Modern integrated circuits are essentially the "brains" of many high-tech products and processes, from computers to home electronics to weapon systems to assembly lines. Sandia works closely with the Department of Energy to assure the quality and reliability of these tiny chips, which can contain millions of transistors in an area the size of a fingernail. Companies both large and small have benefited from this expertise by teaming with federal researchers at Sandia's state-of-the-art facilities for designing and producing microelectronic and photonic devices and compound semiconductors. Together, they continue to improve the performance of electronic systems at the lowest possible cost for both defense and commercial use.

Manufacturing



Michael McDonald checks the accuracy of a robot "what-you-see-is-what-you-get" system to verify that the graphics are predicting the robot's motions.

The need for safe, reliable weapon systems has resulted in decades of experience at Sandia in designing and improving manufacturing processes. This expertise ranges from analyzing the performance of welded joints to using robots to get quality feedback during production. Such capabilities can also help commercial firms improve manufacturing processes and reduce production costs.

For instance, Sandia is working with General Motors to develop new materials and improve automated manufacturing. Rocketdyne is working with Sandia to employ robotic systems to build and monitor the quality of rocket engines. Motorola is using a Sandia-developed process to eliminate the use of hazardous solvents during the manufacture of printed circuit boards. Sandia is working with 3M to produce strong, lightweight materials that can be used in aircraft, bicycle frames, or cars. Sun Microsystems Inc. now has a commercially available information system, based in large part on Sandia software, that enables engineers at different locations to view and manipulate objects simultaneously on linked computer screens.

In fact, the spectrum of manufacturing expertise at Sandia takes in virtually all of the lab's capabilities. It includes robotics, rapid prototyping, precision casting and machining, computer-aided design, modeling and simulation, advanced materials, joining technologies, production planning, environmentally conscious manufacturing, and quality control. It also includes cutting-edge research into such areas as micromechanics and virtual reality applications.

A special process called FASTCAST enables manufacturers to reduce the time needed to develop a product from months to weeks. The process relies on sophisticated computer models to handle design and stress analysis along with state-of-the-art techniques such as laser sintering to produce a precision wax model that doesn't need multiple iterations before it is ready for final casting.

Manufacturing processes are important to Sandia because of their role in defense applications. They are also important to national competitiveness, which is why Sandia strives to share many of these capabilities with U.S. companies through consortia such as the Specialty Metals Processing Consortium and through special projects such as the National

Center for Advanced Information Components Manufacturing. Headquartered at Sandia, this center is dedicated to helping the Energy Department and U.S. industry develop top-quality, competitive flat-panel displays and other information components. Display technologies are important to national security as well as industrial competitiveness, because they will be the centerpiece of an ever-expanding global market for information management.

Pat Candelaria tests the current of an integrated circuit using a device in Sandia's Microelectronics Development Laboratory that can perform 330,000 current measurements per second.

Advanced information technologies

Computer-generated "people" mimic the movements of Sofía Pastoriza-Nuñez and Dave Rogers in a virtual reality lab. Systems such as this can be used to train workers to perform critical tasks.

In July 1994, viewers worldwide saw television footage of comet fragments crashing into the solar system's largest planet. What many of them probably didn't know was that these violent collisions on Jupiter that erupted into brilliant fireballs had been accurately modeled beforehand by Sandia researchers.

From the Univacs of the 1950s that performed thousands of operations per second to the massively parallel systems of today that can perform 100 billion operations per second, Sandia scientists have used computers to process large amounts of information. Today, they use sophisticated computer codes to model nuclear explosions, the human brain, and climate change; design new drugs, precision parts, and synthetic materials; and peer inside the three-dimensional world of the heart, the solar system, and buried waste tanks.

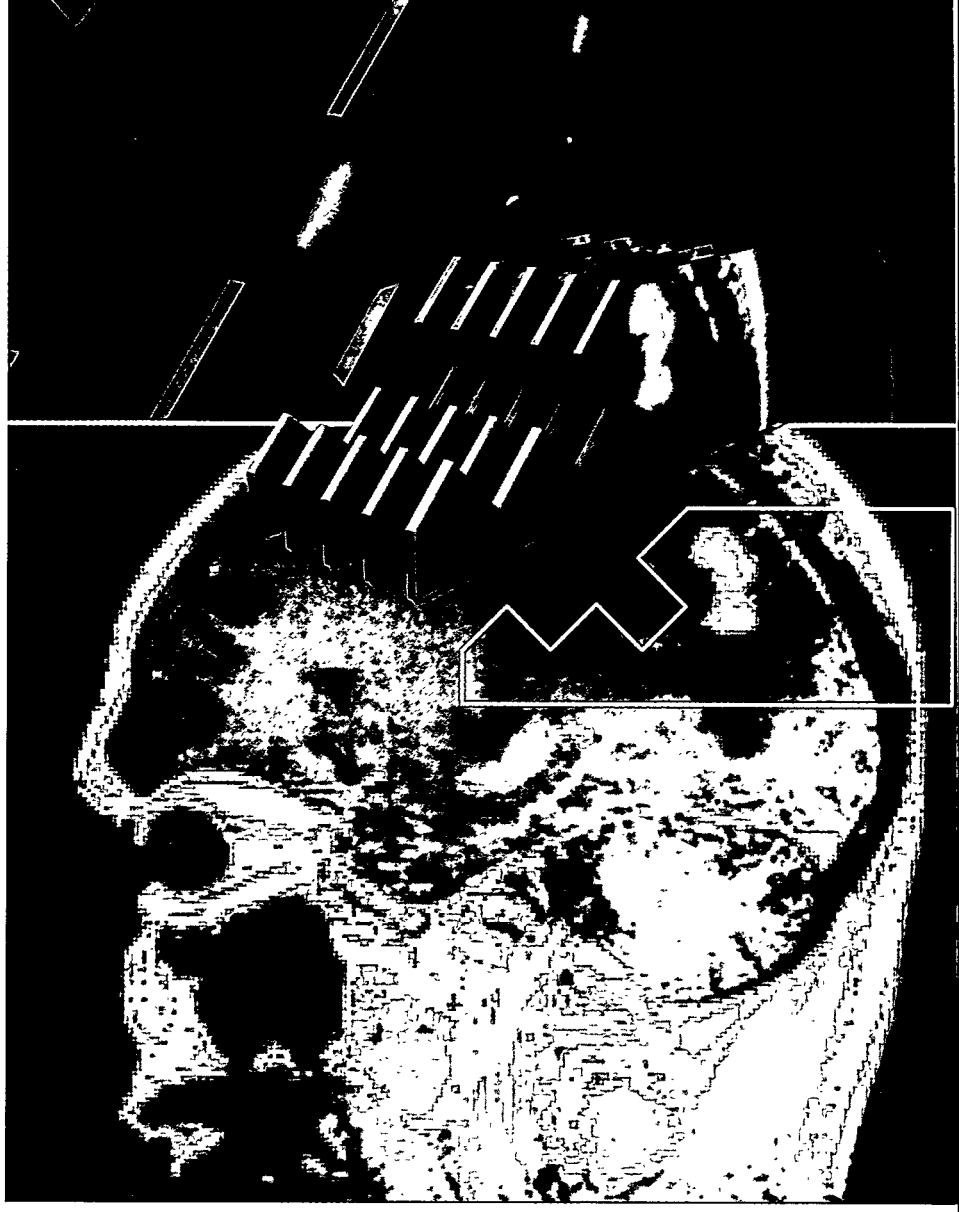
To allow collaboration between researchers at different sites, Sandia's engineers have designed systems that accurately send and receive huge volumes of encrypted high-speed data over long distances. A high-speed transmission line between Sandia's New Mexico and California sites enables researchers at both sites to use the same supercomputers. This technology is helping the federal government develop a national communications highway.

Because computers can process tremendous amounts of information faster and more accurately than humans, they can help people with complicated tasks. For example, neurosurgeons who need to remove brain tumors without damaging other tissue have to first evaluate stacks of magnetic resonance images to determine the size and location of the lesion. A Sandia biomedical project may one day enable them to view a movie that extracts the most important data and displays it in a three-dimensional image.

Computer smarts are also needed to operate robots—often called "intelligent machines" at Sandia. Robotic systems can be used to complete tasks that would be hazardous to humans, such as digging up

buried waste, mapping the contents of underground waste tanks, and monitoring security fences for intruders or breaches. These applications and more — such as robots that could explore the moon or other planets — are being developed at Sandia.

A relatively new area of interest is virtual reality — a technology that allows a user to be immersed in a three-dimensional world of data. An observer can, for example, "see" a microelectronic chip heating up during operation, note the points of most intense thermal increase, and hear audio signals that indicate voltage levels. Special exhibits at Sandia allow visitors to navigate through a three-dimensional California town, the solar system, or an underground waste repository.



Data from magnetic resonance images can be distilled for possible use during surgery. An enlarged image (top) shows a lesion in a patient's brain; the extent of the lesion (middle) is displayed in a three-dimensional "bread loaf" of slices of the data; a magnetic source image (bottom) shows the lesion in the upper right portion of the brain.

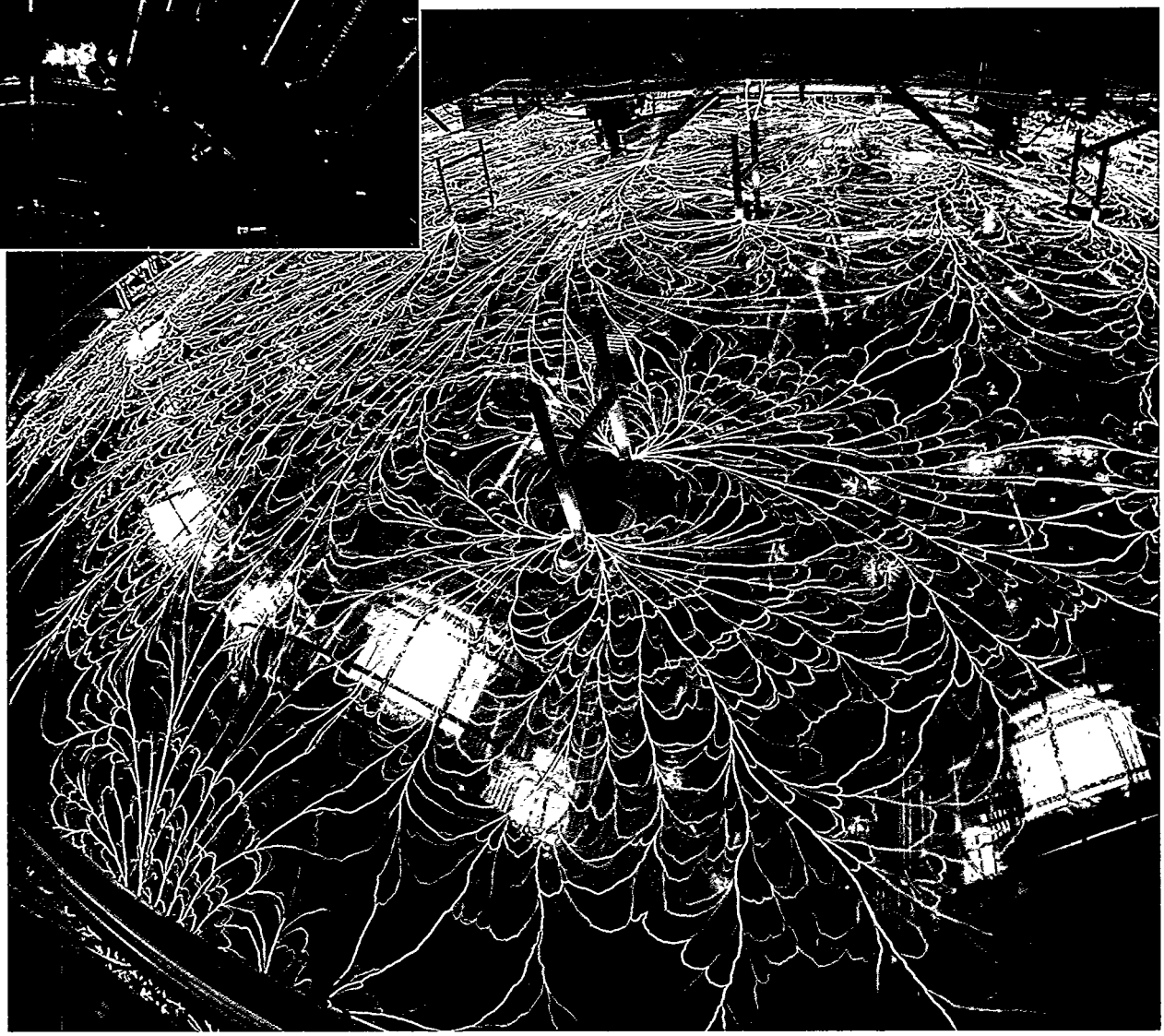
Other information projects include tracking vehicles on a computer screen as they move across a map and monitoring their location and condition via satellite. Years of experience with computer encryption technologies is helping banks and health care organizations protect the confidentiality and integrity of customer data. Energy researchers at Sandia are using computers to design polymers at the molecular level for producing synthetic fuels. Atmospheric researchers are using three-dimensional codes to model climate change, taking in such variables as moisture, air currents, temperature, and cloud cover.

In a world where computers keep financial records, develop film, distribute mail, paint, draw, and color, Sandia is expanding their use to address complicated problems that otherwise couldn't be solved in one person's lifetime.

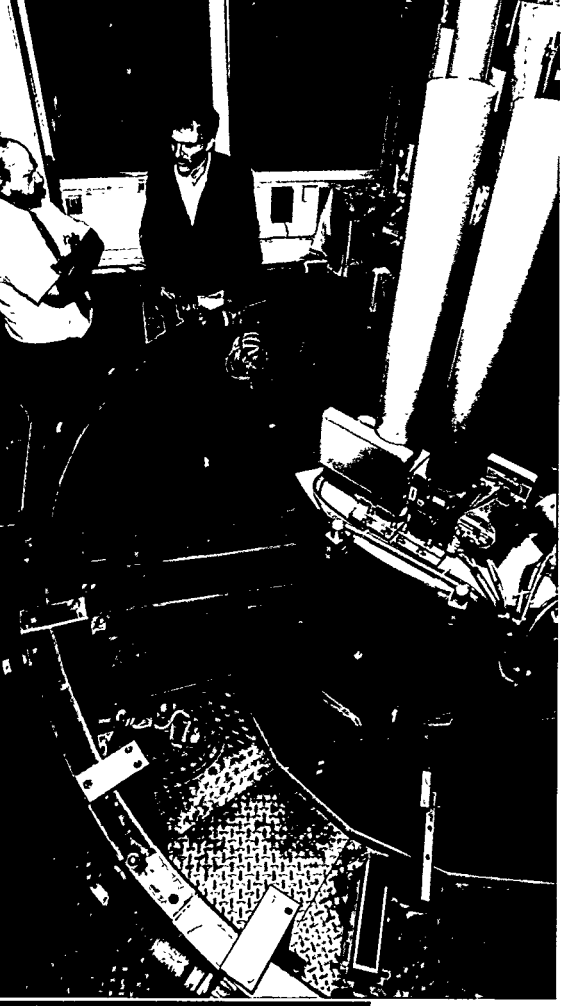
Pulsed power

Pulsed power refers to energy that is collected and released suddenly in short but powerful bursts to create high-intensity beams and radiation sources. This energy can be used to simulate nuclear weapon effects, treat cancer, process special materials, sterilize food, or even generate power.

Working with the Energy Department, Defense Department, and industry, Sandia has



Above: A huge spare cathode cone for the Particle Beam Fusion Accelerator II draws the attention of Norm Augustine (center), chief executive officer of Martin Marietta Corporation, during a visit to Sandia. Joining him are (from left) Doug Bloomquist, Don Cook, Sandia Executive Vice President Jim Tegnelia, and Sandia President Al Narath.



Dick Coats and Dennis Nelson discuss the conversion of the Annular Core Research Reactor to full-scale production of molybdenum-99, one of the most widely used radioisotopes in nuclear medicine.

designed and constructed three of the world's leading pulsed power facilities, including the largest pulsed power accelerator in the world, the Particle Beam Fusion Accelerator II. This accelerator focuses ion beams onto a small fuel pellet. Scientists hope to use this process to cause atoms to fuse and release huge amounts of energy — a lot like harnessing the sun's energy to produce power.

Left: Surface electrical flashovers and underwater electrical arcs light up the Particle Beam Fusion Accelerator II during a shot. PBFA II produces more than 50 trillion watts of power in each pulse.

Currently, PBFA II produces more than 50 trillion watts of power in each pulse. In addition to its role in energy research, PBFA II can be used to investigate the high-energy physics of nuclear detonations, an important capability with the cessation of underground nuclear testing. Understanding nuclear effects is an important part of Sandia's role in maintaining the nation's nuclear weapon stockpile.

Saturn, another pulsed power facility, produces high-intensity X-rays for testing their effect on various weapon components. It produces 25 trillion watts of power in a single pulse.

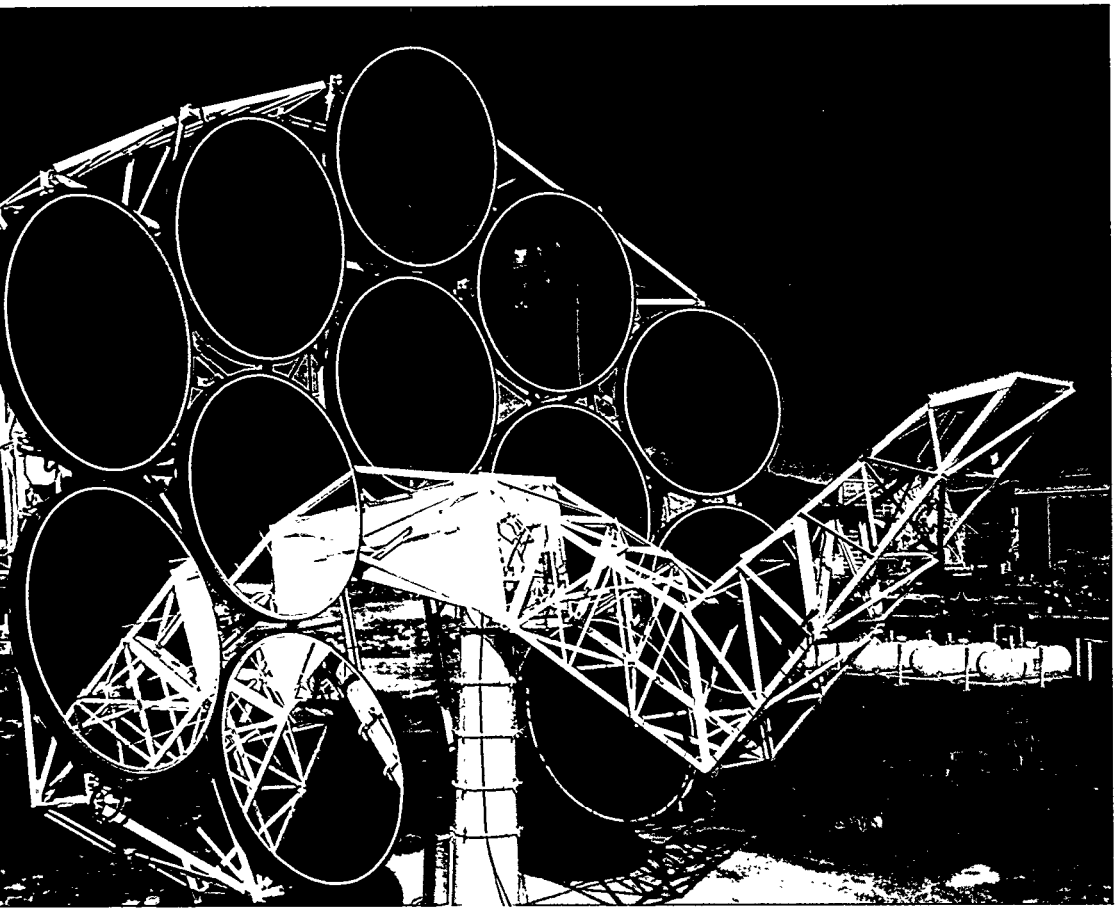
Hermes III produces gamma ray environments and ion beams. It produces 20 trillion watts of power in each pulse and is used to test military hardware and satellite systems.

Other radiation facilities are helping address a variety of problems, such as irradiation of timber or food to destroy harmful organisms. The Energy Department is currently planning to use Sandia's Annular Core Research Reactor to produce the nation's supply of molybdenum-99, a medical isotope used in the treatment of cancer.

Pulsed power offers many opportunities for collaboration with other countries that can both support and benefit from the knowledge gained about radiation environments. Sandia has collaborated with the United Kingdom since the 1960s and is currently pursuing collaborative projects with Russia and France.

Technology transfer

When Roses Southwest Papers, a New Mexico company that supplies paper bags to McDonald's restaurants in 13 states, needed help with a gluing problem, Sandia National Laboratories helped the firm find a commercially available sensor that solved the problem and opened doors to even larger contracts. When a California startup company needed assistance with an interactive "talking book" to teach phonics and reading, Sandia helped design a manufacture-ready prototype.



Reflective mirrors collect and focus sunlight on a single point, yielding intense heat that can be used to run a Stirling engine to produce electricity. This solar concentrator is part of a project between Sandia and Science Applications International Corp.

At the other end of the spectrum, when Cummins Engine Co., a large corporation and leading manufacturer of diesel engines and generators, decided to expand its product line by offering solar thermal power systems, a joint partnership with Sandia helped research and development get under way for a Cummins subsidiary.

Through efforts such as these, Sandia is helping businesses large and small to prosper and grow, from collaborating with Disney in ignition of pyrotechnics

to helping a small manufacturer test environmentally friendly wood coatings.

To date, Sandia has participated in hundreds of joint projects with U.S. industry. All of these collaborations have a dual objective: to promote American competitiveness in the world marketplace while also benefiting the Energy Department. Programs range from on-site technical assistance to full-fledged cooperative research and development agreements. Sandia has signed more than 200 CRADAs with U.S. companies, representing more than $615 million in shared research and development efforts. Sandia participates in industrial consortia of companies with similar markets, such as automobile manufacturers, petroleum producers, or textile manufacturers. Other programs include technical referrals to Sandia researchers, use of Sandia facilities, licensing to move Sandia technologies into new products, business training and workshops, and joint proposals to apply for federal funds through other programs, such as the Advanced Technology Program managed by the Department of Commerce.

Special assistance is available to small businesses. For example, small businesses are eligible for up to $5,000 worth of free technical assistance. A simplified form makes it easier for small companies without large legal staffs to participate in partnership agreements with Sandia; the company and Sandia each provide half the cost of the venture in staff time and in-kind services — Sandia's portion is supported by money set aside by the Department of Energy.

Roberto Espat, quality assurance manager for Roses Southwest Papers, inspects a stack of freshly glued carryout bags. Sandia helped the company improve its gluing process.

Technology Ventures Corporation, a nonprofit subsidiary of Martin Marietta Corporation, is dedicated to working with the private sector to create spinoff enterprises using laboratory technologies, and also provides consulting on how to find funding for technology transfer projects. Another intermediary is the New Mexico Industry Network Corp., known as New Mexico INC.

Women and minorities, who own 38 percent of the small businesses in America, are eligible for special assistance, such as quick access to Sandia's technical know-how. In some instances, they are eligible for sole-source and set-aside opportunities through the federal government.

Improving the competitiveness of all businesses is an essential part of strengthening the economy and security of the United States, and it is a key part of technology transfer at Sandia.

Education outreach

Sandia has always been committed to improving science education, an important effort that is also backed nationwide by the Department of Energy.

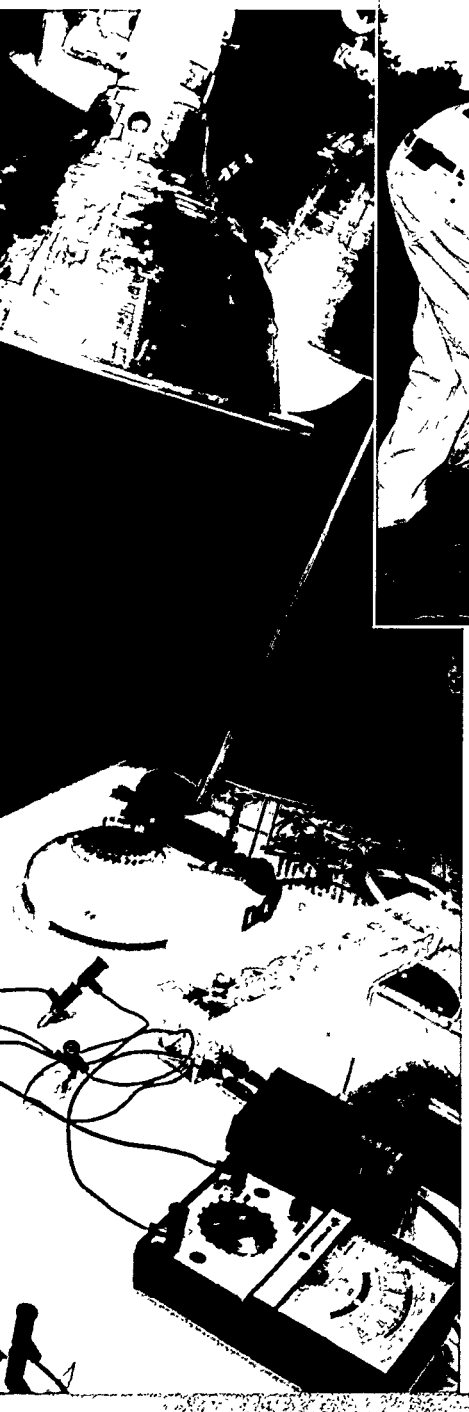
A primary focus of education outreach is support for classroom teachers at all levels. During the summer, teachers work with Sandia researchers in both California and New Mexico to get hands-on experience in science and engineering projects. A month-long teacher training program in California is devoted solely to environmental research.

Volunteer programs match Sandians who have special skills with schools in need of those skills, whether it's tutoring students in English or math, providing Spanish translation for bilingual students, or working on computer systems and teaching staff members to use them.

A popular volunteer effort among Sandia's technical staff in New Mexico places employees in public elementary and middle schools and in Bureau of Indian

A Sandia-sponsored photovoltaics exhibit at the New Mexico State Fairgrounds gives children and their parents a chance to learn about solar energy.

Students at the Southwestern Indian Polytechnic Institute operate a satellite tracking antenna they built with help from a Sandia mentor.



Affairs schools one day a week. In the Science Advisors program, Sandians help science teachers develop classroom demonstrations and answer teachers' questions to enhance their understanding of science and engineering. A similar California program called Science/Math Carnivals places Sandians in one school for an entire day, during which they help stage science demonstrations for students; the event follows four days of training provided to teachers. Both California and New Mexico host regional competitions called Science Bowls for area high schools.

Entire classes often tour Sandia's facilities to help get students excited about science and technology. On an individual basis, Sandians help students prepare for science fair projects, serve as mentors to youngsters interested in science careers, and serve as judges at science fairs. The goal is to provide new ideas and encouragement.

Martin Marietta Corporation, which manages Sandia for the Department of Energy, provides annual scholarships to students who excel academically. A new program is the Thunderbird Award, presented annually to students who overcome significant obstacles to success.

Special college programs sponsored by the Energy Department place graduate students from underrepresented groups in research programs at Sandia where they get hands-on experience in technical fields, such as photonics, microelectronics, computing, photovoltaics, and environmental restoration.

Community involvement

Volunteer Pat Long paints himself out of a corner as he helps spiff up a home that provides services for people with disabilities and their families.

Being a good corporate citizen is more than just running a well-managed business. It's being a good neighbor as well. Sandia's employees have long maintained a tradition of volunteer service.

From coaching developmentally handicapped children in preparation for the Special Olympics to swinging hammers and pounding nails on new homes for low-income families, Sandians have generously offered their time and energy to the betterment of their communities. This year alone, 700 Sandia employees, contractors, retirees and their families have joined Sandia's Volunteers in Action program in New Mexico and the Tri-Valley Volunteerism Council in California. More than 350 have already been placed in community service roles. In 1993, Sandians contributed 7,679 hours to volunteer work — not counting volunteer services provided outside their normal work hours. Last September, 100 New Mexico employees participated in the United Way's Day of Caring; they helped schoolchildren mix mud for adobe bricks, mowed lawns for elderly residents, and offered their services wherever they were needed. In California, Sandia volunteers joined with other corporate employees from throughout the Bay Area to repair and clean the Buenas Vidas youth ranch, paint and repair the Family Crisis Center for homeless women and children, and help handicapped children at the Kaleidoscope Center participate in the Special Olympics.

In addition to donating their time, Sandians contribute generously to local charities. In New Mexico, Sandians pledged nearly $1.5 million to the 1994 United Way campaign. Martin Marietta Corporation, the company that manages Sandia for the Energy Department, kicked in another $50,000. In California, employees donated $159,000 to Bay Area charities. Contributions such as these help support many community needs, such as homes for abused and neglected children, Boy Scouts and Girl Scouts, schools for children with abusive family backgrounds, and adult day care.

Sandians also participate in business and nonpartisan political organizations such as the local chambers of commerce and statewide economic

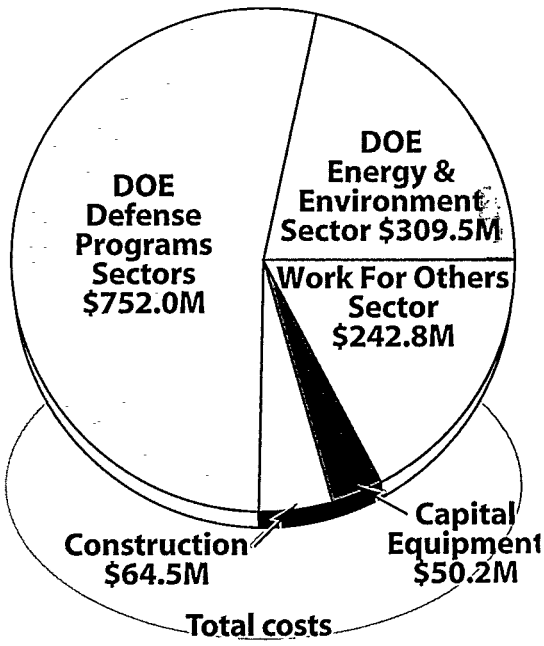
development groups. In New Mexico, Sandia's executive vice president is a member of the board of directors of the Greater Albuquerque Chamber of Commerce. Other Sandians serve on the Albuquerque Hispano and the Livermore chambers of commerce and on committees that tackle issues like water quality, economic development, air quality, education, transportation, and government relations.

A special project under way in New Mexico is Shared Vision Inc. This grass-roots nonprofit group brings educators, environmentalists, businesspeople, health care experts, city planners, Sandians, and many others together to address environmental concerns, business growth and development, transportation problems, and other issues. Sandians also participate in New Mexico First, a statewide organization that holds town meetings to develop action plans for dealing with statewide issues. Recent topics included state economic development and reinventing government.

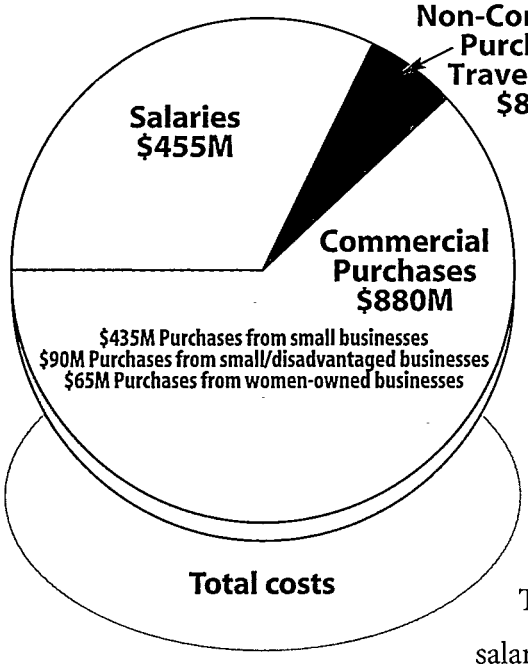
All of these activities, and many more, serve to bring people together, promote trust and mutual assistance, and make changes for the common good. "Ask not what your country can do for you, but what you can do for your country," John F. Kennedy once said. The result is a stronger community, and in turn, a stronger nation.

Isidro Molina (left) helps a young participant at a Special Olympics gathering.

Financial overview



During fiscal year 1994, Sandia National Laboratories continued to focus on its core mission of national defense while broadening work in energy, environment, and economic competitiveness. The Laboratories' total budget for the year was nearly $1.42 billion.



During FY94, which ended Sept. 30, Sandia pumped more than $1.1 billion into the local economies in New Mexico and California. That figure includes salaries, commercial purchases, pensions, and taxes.

In New Mexico, the Labs employed 7,485 full-time employees, representing $400 million in salaries. In California, Sandia paid $55 million in salaries to 1,007 full-time employees.

Commercial purchases totaled $115 million in California and $470 million in New Mexico. Nationwide, Sandia spent $880 million for commercial goods and services.

Sandia is proud of its sponsorship of small, small disadvantaged, and women-owned businesses. Nearly half of all purchases — $435 million — went to small businesses. Small disadvantaged businesses earned nearly $90 million. Women-owned businesses sold $65 million in goods and services to Sandia.

The state of New Mexico collected $45 million in gross receipts taxes from Sandia. While pension expenditures are not part of Sandia's operating costs, payments to retirees were $45 million in New Mexico and $5 million in California. Sandia's pension and savings plans balances were approximately $1.7 billion and $700 million, respectively.

Total operating costs for the year (not counting expenditures for capital equipment and construction) were $1.2 billion. Defense spending represented about half of all expenditures — $752 million — and included $80 million for technology transfer initiatives. Most of the rest went to the Energy and Environment sector and the Work For Others (work for other government agencies) sector.

Statement of financial responsibility

The management of Sandia National Laboratories is responsible for maintaining a suitable system of internal controls for safeguarding the assets entrusted to it by the U.S. taxpayer and ensuring that reports appropriately reflect the financial results of the Laboratories.

An audit committee made up of senior Sandia executives and representatives of Martin Marietta Corporation oversees financial controls at the Laboratories. An internal audit department conducts an extensive series of audits and reviews throughout the year to check for compliance with established control procedures. In 1994, for the first time in history, Sandia engaged the independent auditing firm of Ernst and Young to review its year-end financial reporting to the Department of Energy, to examine its design of internal controls for preventing and detecting misstatements in financial records, and to provide feedback on business practices relative to those of other leading organizations. For the initial year, the Ernst and Young examination was not a comprehensive review; however, the firm identified no material internal control weaknesses. During an audit of Sandia's pension and savings plans, Ernst and Young identified no significant exceptions.

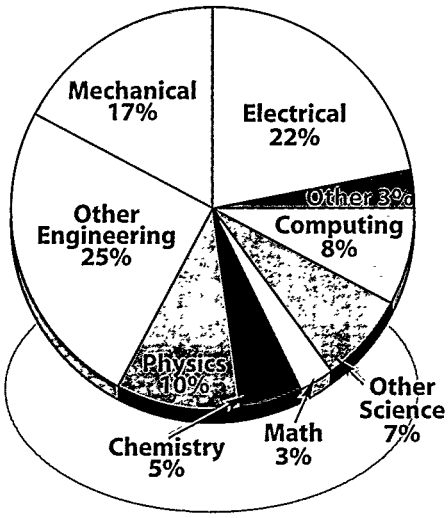
In fiscal year 1995, Sandia intends to conduct a full-scope audit of its financial system and pension and savings plans.

Sandia's management is committed to identifying and implementing changes in business processes that support continuing improvement. Performance improvement teams organized in 1994 will drive changes to position Sandia as the research organization of choice in today's competitive environment. Sandia is actively pursuing opportunities for improvement identified by these teams.

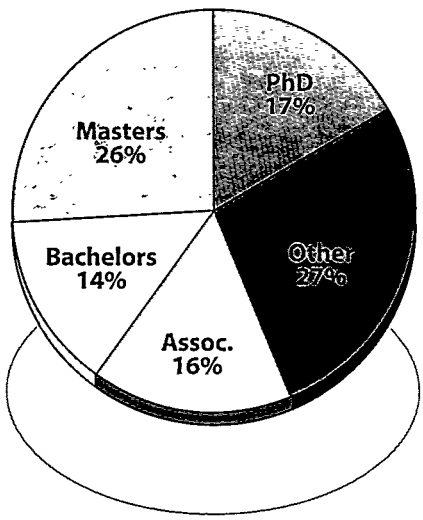
Paul Stanford
Chief financial officer and vice president
of business management

The following charts show the education levels of Sandia's employees:

Sandia's science and engineering staff



All on-roll employees by degree level



Financial overview continued

Comparative Balance Sheet
For fiscal years ending September 30

Assets	FY 1993	FY 1994
Cash on hand	$181,686.53	$1,300,641.39
Accounts receivable	$11,404,329.74	$7,147,324.25
Inventories	$31,408,194.65	$29,155,598.05
Plant and equipment	$830,756,647.54	$881,285,254.63
Other assets	$185,319.60	$190,488.10
Total assets	$873,936,178.06	$919,079,306.42
Liabilities		
Accounts payable and accruals	$242,054,417.37	$201,261,377.96
Other liabilities	$26,581,314.02	$17,304,228.94
Total liabilities	$268,635,731.39	$218,565,606.90
DOE Equity		
DOE Equity, Oct. 1	$560,152,238.07	$605,300,446.67
Equity additions (government funding)	$1,393,258,181.20	$1,454,793,412.71
Equity deductions	($1,348,109,972.60)	($1,359,580,159.86)
Total DOE Equity, Sept. 30	$605,300,446.67	$700,513,699.52
Total liabilities and DOE equity	$873,936,178.06	$919,079,306.42

Comparative Statement of Operations
For fiscal years ending September 30

Program and description	FY 1993	FY 1994
Fossil energy	$10,556,119.38	$12,823,754.11
Nuclear energy	$6,075,955.76	$4,523,173.21
Civilian radioactive waste	$15,491,879.37	$16,711,953.32
Conservation/renewable energy	$57,191,890.77	$52,150,321.08
Defense programs	$865,649,573.87	$669,290,033.66
Human resources administration	$793.25	$26,533.73
Environment, safety & health	$742,783.56	$702,661.23
Energy research	$37,393,236.44	$33,282,444.32
Environmental restoration and waste management	$128,766,299.11	$163,751,008.69
Regulatory and administrative	$4,306,667.50	$354,712.02
Nonproliferation and national security	0	$101,145,475.69
Other	0	$2,080,950.23
Work for other agencies	$297,384,062.99	$407,618,495.52
Reimbursement revenue for work for others	($297,384,062.99)	($294,941,595.41)
Cost of operations	$1,126,175,199.01	$1,169,519,921.40
Procurement and production	($98,976,643.97)	($107,456,364.26)
Net cost of operations	($1,027,198,555.04)	($1,062,063,557.14)

Comparative Statement of Changes in Financial Position
For fiscal years ending September 30

	FY 1993	FY 1994
Fund balance treasury and cash, beginning of period	$140,274.30	$181,686.53
Total sources of funds	$1,679,726,690.03	$1,701,933,896.08
Total uses of funds	($1,679,685,277.80)	($1,702,115,216.25)
Fund balance treasury and cash, end of period	$181,686.53	$366.36

Contacts

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California: Karen Scott, (510) 294-3760

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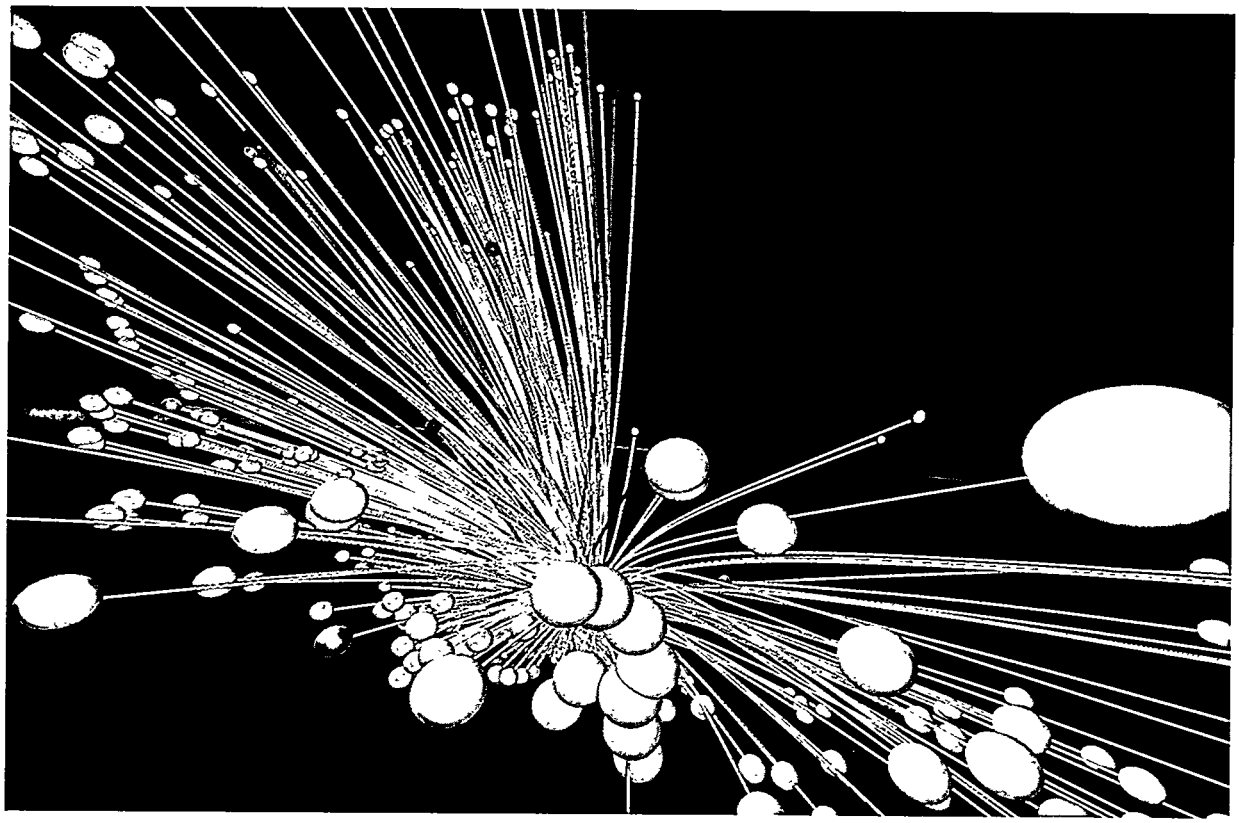
Sandia also has an information page on the World Wide Web.

Address: http://www.sandia.gov



The historic collision of Shoemaker-Levy 9 with Jupiter in July 1994 spewed cometary debris thousands of miles into space. A computer code developed at Sandia National Laboratories accurately simulated the event beforehand; shown here is a computer representation of the ejection of debris from the giant planet's atmosphere.