**Sandia National Laboratories**

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| Sandia National Laboratories |
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| **Established** | 1948 |
| **Research type** | National security, nuclear science |
| **Budget** | US $2.4 billion |
| **Director** | Paul J. Hommert |
| **Staff** | 8,400 |
| **Location** | Albuquerque, New Mexico, Livermore, California |
| **Campus** | 8,699 acres (35.20 km2) |
| **Operating agency** | Sandia Corporation, a Lockheed Martin company |
| **Website** | www.sandia.gov |

The **Sandia National Laboratories**, managed and operated by the Sandia Corporation (a wholly owned subsidiary of Lockheed Martin Corporation), are two major United States Department of Energy research and development national laboratories.

Their primary mission is to develop, engineer, and test the non-nuclear components of nuclear weapons. The primary campus is located on Kirtland Air Force Base in Albuquerque, New Mexico and the other is in Livermore, California, next to Lawrence Livermore National Laboratory. Sandia is a National Nuclear Security Administration laboratory.

It is Sandia's mission to maintain the reliability and surety of nuclear weapon systems, conduct research and development in arms control and nonproliferation technologies, and investigate methods for the disposal of the United States' nuclear weapons program's hazardous waste. Other missions include research and development in energy and environmental programs, as well as the surety of critical national infrastructures. In addition, Sandia is home to a wide variety of research including computational biology, mathematics (through its Computer Science Research Institute), materials science, alternative energy, psychology, MEMS, and cognitive science initiatives. Sandia formerly hosted ASCI Red, one of the world's fastest supercomputers until its recent decommission, and now hosts ASCI Red Storm, originally known as Thor's Hammer. Sandia is also home to the Z Machine. The Z Machine is the largest X-ray generator in the world and is designed to test materials in conditions of extreme temperature and pressure. It is operated by Sandia National Laboratories to gather data to aid in computer modeling of nuclear weapons.

**Lab history**

One of Sandia's first permanent buildings (Building 800) was completed in 1949

Sandia National Laboratories' roots go back to World War II and the Manhattan Project. Prior to the United States formally entering the war, the U.S. Army leased land near Albuquerque, New Mexico airport known as Oxnard Field, to service transient Army and U.S. Navy aircraft. In January 1941 construction began on the Albuquerque Army Air Base, leading to establishment of the *Bombardier School-Army Advanced Flying School* near the end of the year. Soon thereafter it was renamed Kirtland Field, after early Army military pilot Colonel Roy S. Kirtland, and in mid-1942 the Army acquired Oxnard Field. During the war years facilities were expanded further and Kirtland Field served as a major Army Air Forces training installation.

In the many months leading up to successful detonation of the first atomic bomb, the Trinity test, and delivery of the first airborne atomic weapon, Project Alberta, J. Robert Oppenheimer, Director of Los Alamos Laboratory, and his technical advisor, Hartly Rowe, began looking for a new site convenient to Los Alamos for the continuation of weapons development – especially its non-nuclear aspects. They felt a separate division would be best to perform these functions. Kirtland had fulfilled Los Alamos' transportation needs for both the Trinity and Alberta projects, thus, Oxnard Field was transferred from the jurisdiction of the Army Air Corps to the U.S. Army Service Forces Chief of Engineer District, and thereafter, assigned to the Manhattan Engineer District. In July 1945, the forerunner of Sandia Laboratory, known as "Z" Division, was established at Oxnard Field to handle future weapons development, testing, and bomb assembly for the Manhattan Engineer District. The District-directive calling for establishing a secure area and construction of "Z" Division facilities referred to this as "Sandia Base" — apparently the first official recognition of the "Sandia" name.

Sandia Laboratory was operated by the University of California until 1949, when President Harry S. Truman asked Western Electric, a subsidiary of American Telephone and Telegraph (AT&T), to assume the operation as an "opportunity to render an exceptional service in the national interest." Sandia Corporation, a wholly owned subsidiary of AT&T Corporation, managed and operated the laboratory until October 1993. The United States Congress designated Sandia Laboratories as a National laboratory in 1979. Today, Sandia National Laboratories (SNL) is managed and operated by **Sandia Corporation**, a wholly owned subsidiary of Lockheed Martin Corporation, and includes government-owned facilities in Albuquerque, New Mexico (SNL/NM); Livermore, California (SNL/CA); Tonopah, Nevada; and Kauai, Hawaii. SNL/NM is headquarters and the largest laboratory, employing more than 6,600 employees, while SNL/CA is a smaller laboratory, with about 850 employees. Tonopah and Kauai are occupied on a "campaign" basis, as test schedules dictate.

**Legal issues**

On February 13, 2007, a New Mexico State Court found Sandia Corporation liable for $4.7 million in damages for the firing of a former network security analyst, Shawn Carpenter, who had reported to his supervisors that hundreds of military installations and defense contractors' networks were compromised and sensitive information was being stolen – including hundreds of sensitive Lockheed documents on the Mars Reconnaissance Orbiter project. When his supervisors told him to drop the investigation and do nothing with the information, he went to intelligence officials in the United States Army and later the Federal Bureau of Investigation to address the national security breaches. When Sandia managers discovered his actions months later, they revoked his security clearance and fired him.

**Technical areas**

SNL/NM consists of five technical areas (TA) and several additional test areas. Each TA has its own distinctive operations; however, the operations of some groups at Sandia may span more than one TA, with one part of a team working on a problem from one angle, and another subset of the same team located in a different building or area working with other specialized equipment. A description of each area is given below.

TA-I operations are dedicated primarily to three activities – the design, research, and development of weapon systems; limited production of weapon system components; and energy programs. TA-I facilities include the main library and offices, laboratories, and shops used by administrative and technical staff.

TA-II is a 45 acre (180,000 m²) facility that was established in 1948 for the assembly of chemical high explosive main charges for nuclear weapons and later for production scale assembly of nuclear weapons. Activities in TA-II include the decontamination, decommissioning, and remediation of facilities and landfills used in past research and development activities. Remediation of the Classified Waste Landfill which started in March 1998, neared completion in FY2000. A testing facility, the Explosive Component Facility, integrates many of the previous TA-II test activities as well as some testing activities previously performed in other remote test areas. The Access Delay Technology Test Facility is also located in TA-II.

TA-III is adjacent to and south of TA-V [both are approximately seven miles (11 km) south of TA-I]. TA-III facilities include extensive design-test facilities such as rocket sled tracks, centrifuges and a radiant heat facility. Other facilities in TA-III include a paper destructor, the Melting and Solidification Laboratory and the Radioactive and Mixed Waste Management Facility (RMWMF). RMWMF serves as central processing facility for packaging and storage of low-level and mixed waste. The remediation of the Chemical Waste Landfill, which started in September 1998, is an ongoing activity in TA-III.

TA-IV, located approximately 1/2 mile (1 km) south of TA-I, consists of several inertial-confinement fusion research and pulsed power research facilities, including the High Energy Radiation Megavolt Electron Source (Hermes-III), the Z Facility, the Short Pulsed High Intensity Nanosecond X-Radiator (SPHINX) Facility, and the Saturn Accelerator. TA-IV also hosts some computer science and cognition research.

TA-V contains two research reactor facilities, an intense gamma irradiation facility (using cobalt-60 and caesium-137 sources), and the Hot Cell Facility.

SNL/NM also has test areas outside of the five technical areas listed above. These test areas, collectively known as Coyote Test Field, are located southeast of TA-III and/or in the canyons on the west side of the Manzanita Mountains. Facilities in the Coyote Canyon Test Field include the Solar Tower Facility (34.9623 N, 106.5097 W), the Lurance Canyon Burn Site and the Aerial Cable Facility.

**Open source software**

In the 1970s, the Sandia, Los Alamos, Air Force Weapons Laboratory Technical Exchange Committee initiated the development of the SLATEC library of mathematical and statistical routines, written in FORTRAN77.

Today, Sandia National Laboratories is home to several open source software projects:

* The Feature Characterization Library, FCLib, is a library for the identification and manipulation of coherent regions or structures from spatio-temporal data. FCLib focuses on providing data structures that are "feature-aware" and support feature-based analysis. It is written in C and developed under a "BSD-like" license.
* LAMMPS (Large-scale Atomic/Molecular Massively Parallel Simulator) is a molecular dynamics library that can be used to model parallel atomic/subatomic processes at large scale. It is produced under the GNU General Public License (GPL) and distributed on the Sandia National Laboratories website as well as SourceForge.
* The MapReduce-MPI Library is an implementation of MapReduce for distributed-memory parallel machines, utilizing the Message Passing Interface (MPI) for communication . It is developed under a modified Berkeley Software Distribution license.
* The Multithreaded Graph Library (MTGL) is a collection of graph-based algorithms designed to take advantage of parallel, shared-memory architectures such as the Cray XMT, Symmetric Multiprocessor (SMP) machines, and multi-core workstations. It is developed under a BSD License.
* ParaView is a cross-platform application for performing data analysis and visualization. It is a collaborative effort, developed by Sandia National Laboratories, Los Alamos National Laboratories, and the United States Army Research Laboratory, and funded by the Advanced Simulation and Computing Program. It is developed under a BSD license.
* Soccoro, a collaborative effort with Wake Forest and Vanderbilt Universities, is object-oriented software for performing electronic-structure calculations based on density-functional theory. It utilizes libraries such as MPI, BLAS, and LAPACK and is developed under the GNU General Public License.
* The Titan Informatics Toolkit is a collection of cross-platform libraries for ingesting, analyzing, and displaying scientific and informatics data. It is a collaborative effort with Kitware, Inc., and leverages various open source components such as the Boost Graph Library. It is developed under a New BSD license.
* Trilinos is an object oriented library for building scalable scientific and engineering applications, with a focus on linear algebra techniques. It is licensed under the GNU Lesser General Public License.
* LibVMI is a library for simplifying the reading and writing of memory in running virtual machines, a technique known as virtual machine introspection. It is licensed under the GNU Lesser General Public License.

In addition, Sandia National Laboratories collaborates with Kitware, Inc. in developing the Visualization Toolkit (VTK), a cross-platform graphics and visualization software suite. This collaboration has focused on enhancing the information visualization capabilities of VTK, and has in turn fed back into other projects such as ParaView and Titan.

**See also**

* [ASCI Red](http://en.wikipedia.org/wiki/ASCI_Red)
* [Titan Rain](http://en.wikipedia.org/wiki/Titan_Rain)
* [Shawn Carpenter](http://en.wikipedia.org/wiki/Shawn_Carpenter)
* [Z machine](http://en.wikipedia.org/wiki/Z_machine)
* [Red Storm](http://en.wikipedia.org/wiki/Red_Storm_%28computing%29)
* [Kirtland Air Force Base](http://en.wikipedia.org/wiki/Kirtland_Air_Force_Base)
* [National Renewable Energy Laboratory](http://en.wikipedia.org/wiki/National_Renewable_Energy_Laboratory)
* [Test Readiness Program](http://en.wikipedia.org/wiki/Test_Readiness_Program)
* [ParaView](http://en.wikipedia.org/wiki/ParaView)
* [VTK](http://en.wikipedia.org/wiki/VTK)
* [Jess programming language](http://en.wikipedia.org/wiki/Jess_programming_language)

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